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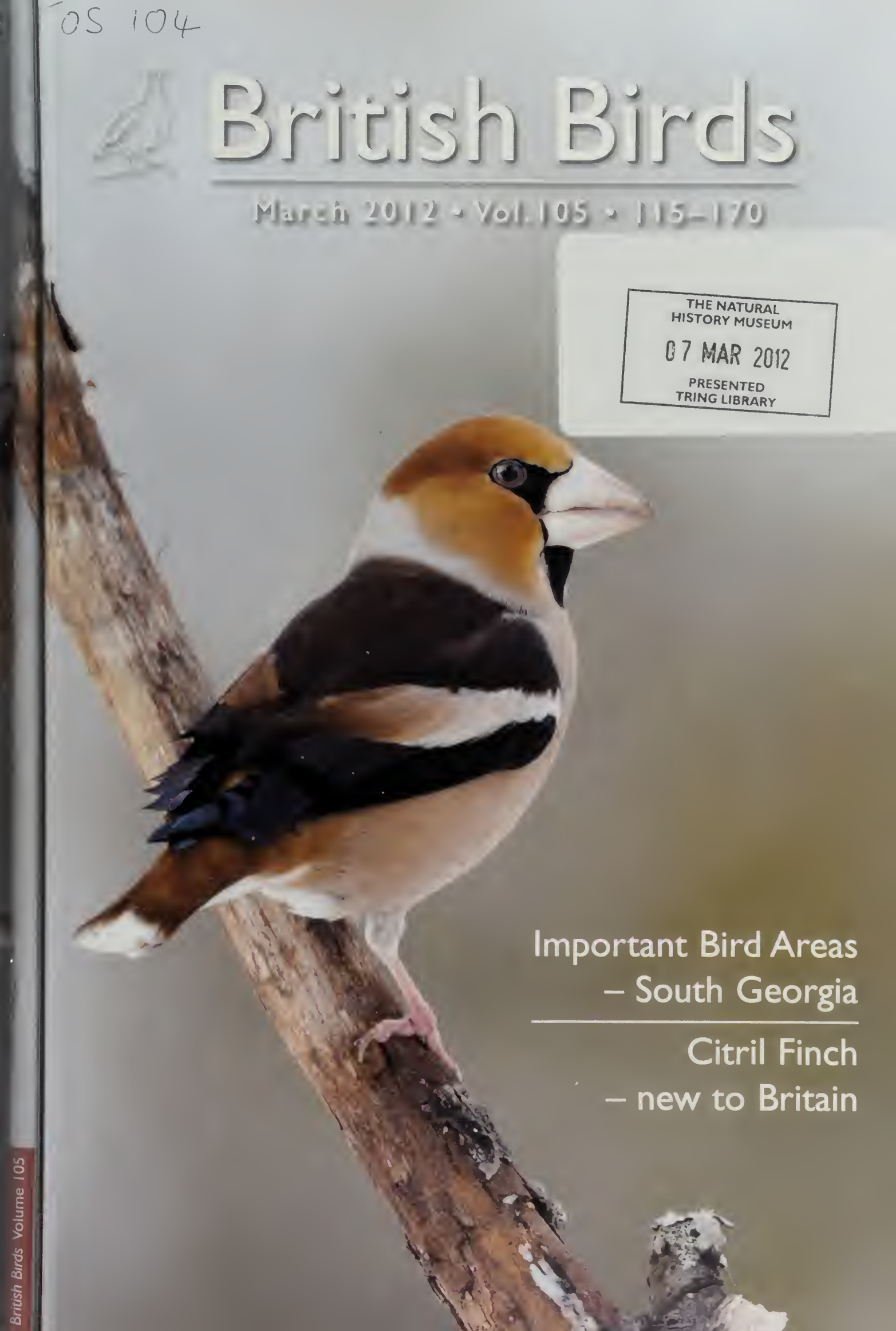

Important Bird Areas – South Georgia

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British Birds Volume 105

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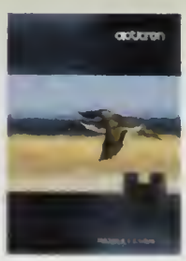

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British Birds

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British Birds aims to: ❖ provide an up-to-date magazine for everyone interested in the birds of the Western Palearctic; ❖ publish a range of material on behaviour, conservation, distribution, ecology, identification, movements, status and taxonomy as well as the latest ornithological news and book reviews; ❖ maintain its position as the journal of record; and ❖ interpret scientific research on birds in an easily accessible way.

Editorial

South Georgia – a very Important Bird Area

It is estimated that over 100 million individual seabirds are based on South Georgia, a UK Overseas Territory in the Southern Ocean. That sounds to me like a pretty important Important Bird Area. Yet that staggering total, while enough to get any decent birder or ornithologist salivating wildly, is probably substantially below the numbers that would have existed before man intervened.

'Civilisation' appears to have thrown the book at South Georgia. Brown Rats *Rattus norvegicus* arrived with the sealers in the latter half of the 1700s and spread across much of the island, with substantial effect on the populations of the endemic South Georgia Pipits *Anthus antarcticus*, the small burrowing White-chinned Petrels *Procellaria aequinoctialis* and the South Georgia Pintails *Anas georgica*. The House Mouse *Mus domesticus* has also had a go, with drastic effects. And Reindeer *Rangifer tarandus*, brought in by the whalers as a source of food, haven't helped, altering the vegetation with their grazing and also causing trampling.

Nature, not man, brings the Antarctic Fur Seals *Arctocephalus gazella* to breed on South Georgia and erode the typical tussac grassland. Beyond the now controlled waters of the extensive feeding areas around the island, fishing and more recently longlining have also significantly affected albatross and petrel species.

So, the 100-million-seabirds figure is a bit of a miracle and it is a real challenge to see what the number might be if some of the human impacts were reversed.

The South Georgia Heritage Trust has set itself the task of doing just that. The Trust's work covers the historical heritage of the island as well as the natural one, with the heroic story of Shackleton's superhuman endeavours a centrepiece of the history of the island. But the Trust, of which I am privileged and excited to be a President, has something pretty heroic and superhuman planned for the natural heritage. For the last five years, the Trust has been preparing and fundraising for the biggest rat and mouse eradication programme ever delivered, in order to restore the island's bird populations to their original glory. The scale of ambition in the programme is almost of crazed proportions. The area covered is ten times bigger than that of any previous eradication programme. We are all probably certifiable! But the impressive and painstaking research, the immensely careful and detailed planning, the extensive effort to demonstrate and communicate the doability of the project and the charm with which key figures have conjured up support and resources worldwide is real. (One of the areas involved is named Thatcher Peninsula – for obvious reasons – and it was a delight to see how some donors warmed to the prospect of carpet-bombing something called Thatcher with rat poison!)

Phase 1 of the eradication programme took place in 2011 and was run like a military exercise and with great success. Conservation tools used to be binoculars, telescopes and field notebooks. South Georgia conservationists buy helicopters (we are very proud of our two) and beg for astronomical amounts of rat poison. They build fuel dumps and work out how to transport machines long distances on ships and tranship them in lousy weather. They agonise about where to maintain equipment – in situ, with the ever-present weather challenges, or with yet another transhipment back to the Falkland Islands.

They acquire at least two of everything

like acquisitive jackdaws. You can't pop out and buy something that breaks or gets mislaid when you are thousands of miles from the shops and have a narrow window of weather opportunity to fly and spread bait. We did drop the helicopter bait bucket in the ocean almost immediately we began Phase 1, but we had thought of that and had another and also dredged the dropped one out of the sea and hammered it back into shape in typical can-do style.

The helicopter flying for the bait-laying was precision, satellite aided and expert. It drew staff from eradication projects elsewhere in the world, particularly New Zealand, who would win a gold if rodent eradication were an Olympic sport. Teamwork was vital and the team was a joy to behold, blending skills and comradeship, sometimes not an easy thing to do. Above all, the weather was kind and the flying hours that were so needed were flown.

Phase 1 was completed in half the anticipated time and under budget. Close monitoring seems to indicate that the baiting was successful and no rats have been seen in the trial area since the spreading of the bait in March 2011. The monitoring programme covers rats, birds and also how the bait pellets break down and become harmless. The results to date are encouraging. Every day has brought the agonies of looking for rat tracks in the snow while hoping earnestly not to find them. Besides the lack of any sign of rats so far, the inevitable loss of some birds has already been shown to be recoverable. South Georgia Pintails were the hardest hit immediately after baiting, but in only a few months their numbers around King Edward Cove had recovered substantially, due partly to the ducklings that started emerging once the rats had disappeared. The exciting prospect now is that the Phase 1 area, for decades a 'sink' for ducks, where few if any were reared, will soon generate a surplus of young pintails. It would be nice if the skuas recognised how precious and expensive these ducklings are and cherished them, rather than having a go!

The convention is that two years have to pass without any sign of rats before an eradication project can be deemed a success, but it is looking good.

Phase 1 covered 12,500 ha, but that dealt with only 12% of the rat-infested land area of South Georgia. The main phase of the project will tackle the remainder of the island, is estimated to cost approximately £5 million and will take two to three Antarctic seasons to complete, beginning in 2013. There is no time to waste: climate change means that the glaciers currently dividing the island are retreating, threatening to release more areas to rodent colonisation in a few years. Donations to help this visionary project can be made via the South Georgia Heritage Trust website (www.sght.org). Restoring a hectare of the island forever costs £90, a square mile costs £23,000 and there are 94,000 hectares or 360 square miles to cover!

Once the project has been completed, vigilance and biosecurity measures will still be required as between 6,000 and 7,000 people visit South Georgia each year, from cruise ships to those associated with fishing, research and the military. Personally, I would ask for strip searches of everyone landing on the island in case they had a rodent secreted about their person, an indignity I once suffered on a much cherished, rat-free New Zealand island that will remain nameless. At least that's what they said it was about! Can we please also tell Argentinian scrap dealers that they are unwelcome?

But effective eradication followed by ongoing biosecurity and monitoring should mean that previously threatened or depleted species should start to bounce out of the ground, some faster than others. For me, success will be when there are pipits in abundance. I only hope that I can muster aged strength to visit South Georgia in 30 years' time to see how even more important one of the most important Important Bird Areas has become.

Barbara, Baroness Young of Old Scone

Barbara Young, Baroness Young of Old Scone, is a President of the South Georgia Heritage Trust. She has been involved with bird and environmental organisations for over 20 years and was formerly Chief Executive of the RSPB and Chief Executive of the Environment Agency. She is currently President of the BTO, President of the Cambridgeshire, Bedfordshire and Northamptonshire Wildlife Trust, a Vice-president of the RSPB, of BirdLife International, and of Flora and Fauna International. She is also Chancellor of Cranfield University. Her global bird list is extensive but (she tells us) unreliable.

Important Bird Areas

South Georgia

Andrew Clarke, John P. Croxall, Sally Poncet, Anthony R. Martin and Robert Burton

Bruce Pearson

South Georgia from the sea; a typical first view of the island.

Abstract The mountainous island of South Georgia, situated in the cold but productive waters of the Southern Ocean, is a UK Overseas Territory and one of the world's most important seabird islands. It is estimated that over 100 million seabirds are based there, while there may have been an order of magnitude more before the introduction of rats. South Georgia has 29 species of breeding bird, and is the world's most important breeding site for six species (Macaroni Penguin *Eudyptes chrysolophus*, Grey-headed Albatross *Thalassarche chrysostoma*, Northern Giant Petrel *Macronectes halli*, Antarctic Prion *Pachyptila desolata*, White-chinned Petrel *Procellaria aequinoctialis* and Common Diving Petrel *Pelecanoides urinatrix*). Several of the key species are globally threatened or near-threatened, which emphasises the need for action to improve the conservation status of the island's birds. South Georgia is currently classified by BirdLife International as a single Important Bird Area (IBA) but it may be better considered as comprising several distinct IBAs. Current threats to the South Georgia avifauna include rats (a major campaign to eliminate rats began in 2010/11), regional climate change, and incidental mortality in longline and trawl fisheries. Local fisheries are now well regulated but South Georgia albatrosses and petrels are still killed in large numbers in more distant fisheries.

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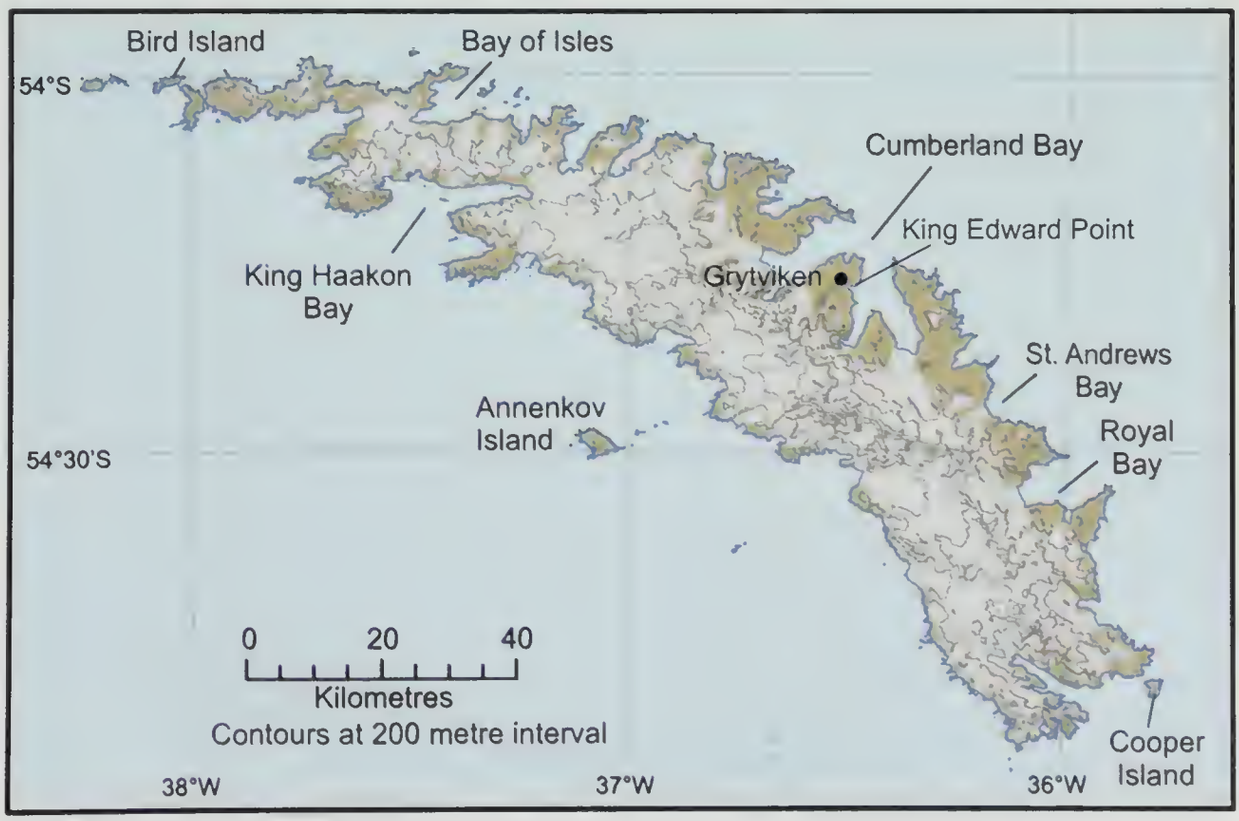
This paper is dedicated to the memory of Peter Prince (1948–1998), who worked on South Georgia from 1971. His enthusiasm and commitment to the development of Antarctic ornithology was unbounded and left an indelible impression on all who were lucky enough to know and work with him. See plate 89, p. 144.

Introduction

Isolated, mountainous and surrounded by the tempestuous waters of the Southern Ocean, South Georgia has long fascinated biologists and travellers alike. In the late nineteenth and early twentieth centuries the island was the site of industrial-scale exploitation of marine mammals and seabirds, but nowadays it is a location for important biological work and is much visited by tourists attracted by the wealth of wildlife set in spectacular scenery. The occasional tourist visited South Georgia from the early twentieth century, but the start of modern tourism was the arrival of the *Lindblad Explorer*, a vessel constructed explicitly for polar tourism, in 1970. This was joined by *World Discoverer* in the 1977/78 season, and by the early 1990s several vessels were including South Georgia on their Antarctic itineraries (Poncet & Crosbie 2005). Modern ship-based tourism has thus brought the wildlife riches of South Georgia within the reach of many birders.

South Georgia lies between latitudes 53°S and 55°S, and between longitudes 34°W and 42°W. It is extremely isolated, and lies about 1,400 km ESE of the Falkland Islands, 1,550 km northeast of the nearest point on the Antarctic continent, 2,150 km east of South America and 4,800 km from South Africa. The main island of South Georgia is 170 km long and 2–40 km wide, and is orientated northwest to southeast. It is surrounded by over 70 islands, islets, stacks and rocks. The larger offshore islands are well vegetated and hold important populations of breeding seabirds. They include Willis Islands and Bird Island off the northwest extremity, Cooper Island off the southeast extremity, and Annenkov Island, 15 km off the central southwest coast (fig. 1). Further away lie Shag Rocks, 250 km west of the island, and Clerke Rocks, 75 km east of the southeast end. Both are topographically part of the South Georgia continental shelf, and hence are considered with 'mainland' South Georgia in this article.

South Georgia is the highest of all the subantarctic islands and has a landscape dominated by spectacular alpine topography. The central backbone of the island is formed by the Allardyce and Salvesen Ranges, and these separate two coasts of contrasting topography and



Map courtesy of British Antarctic Survey

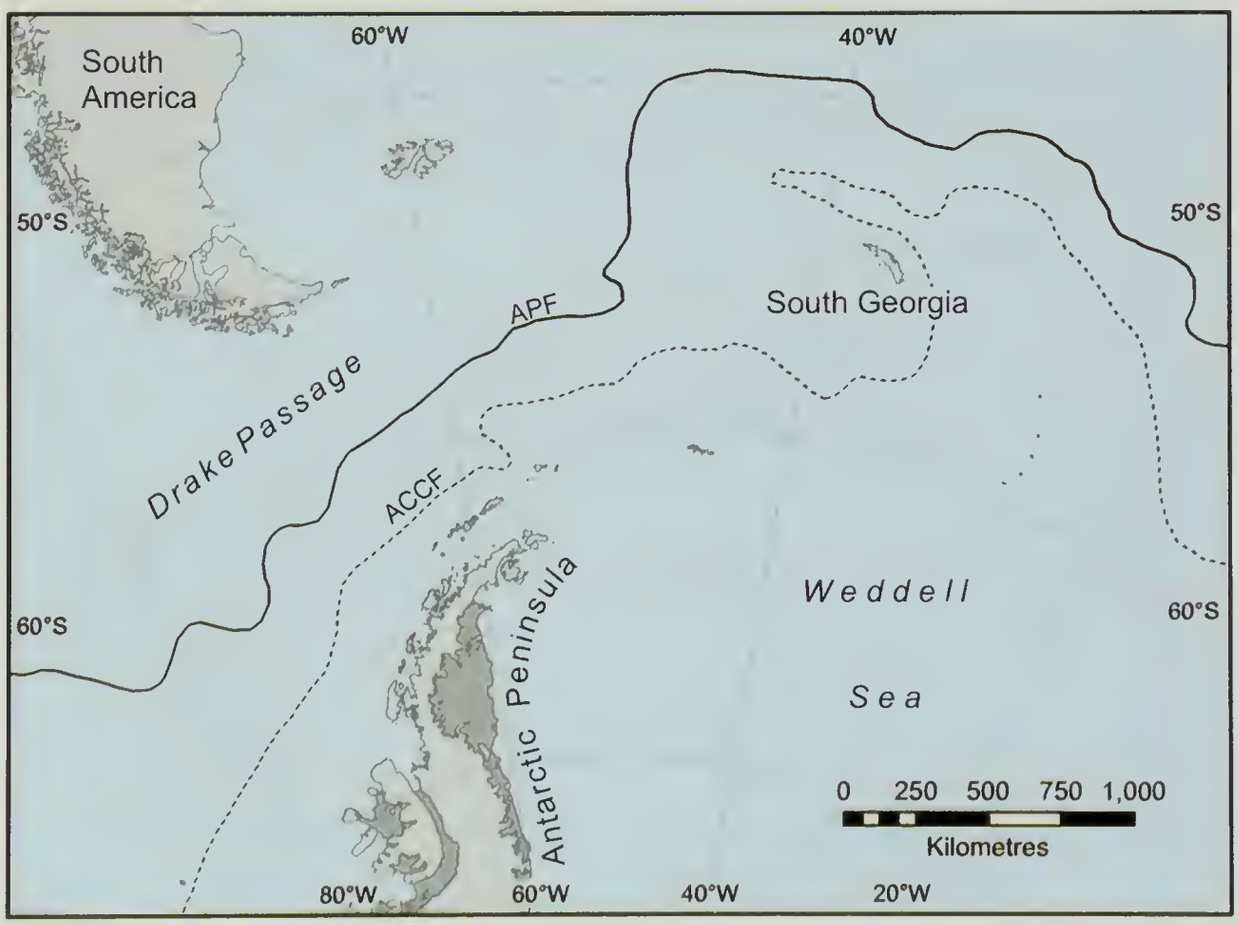
Fig. 1. A map of South Georgia showing the distribution of permanent snow and ice, and some key locations mentioned in the text.

climate. There are at least 20 peaks over 2,000 m, the highest being Mt Paget (2,934 m). Much of the land is over 1,000 m in altitude; at least half is covered in permanent ice and snow and there are more than 160 glaciers. The southern coastline is fully exposed to the prevailing westerly weather systems and is therefore colder, wetter and more heavily glaciated than the northern coastline. The southern coastline is predominantly rock and ice, with permanent snow and ice starting at 300 m altitude, and lowland areas covered with extensive tussac grassland are uncommon. In contrast, the northern coast is more sheltered, with a permanent snowline starting at 400–600 m altitude, and has extensive ice-free vegetated peninsulas bounded by glaciers, many of which now terminate on land.

Geological and oceanographic setting

Geologically, South Georgia forms part of the great mountain chain that once bordered the vast continental landmass of Gondwana. Its origins are therefore linked to both the Andes and the Transantarctic Mountains. Tectonic forces have, however, fragmented this chain of mountains into the string of islands that nowadays forms the Scotia arc. The bulk of South Georgia is formed of sandstones and mudstones, the alternation of which gives the area of the Allardyce Range its striped appearance, although the Barff Peninsula south to Gold Harbour comprises quartz-rich sandstones. The southern corner is very different geologically, being formed by massive igneous or metamorphic rocks deriving from the edge of Gondwana and pierced by many doleritic volcanic dykes. This lends a harsh and stark aspect to a landscape dominated by snow- and ice-clad mountains.

Oceanographically, South Georgia lies in the path of the Antarctic Circumpolar Current, which flows clockwise (eastwards) around Antarctica between latitudes 50° and 60°S, driven by the predominantly westerly winds. These eastward-flowing Antarctic waters have surface temperatures between 0°C and 4°C. In the area of the Scotia Sea, the flow of this powerful current is constrained by the



Map courtesy of British Antarctic Survey

Fig. 2. The oceanographic setting of South Georgia. The Antarctic Polar Front (APF) marks the northernmost limit of the Southern Ocean, and thus defines the Antarctic faunal zone. The ACCF is the oceanographic front that marks the southern boundary of the Antarctic Circumpolar Current.

bottleneck of the Drake Passage and the extensive undersea ridge of the Scotia arc. Within the Antarctic Circumpolar Current lies a sharp discontinuity in ocean surface temperature, the Antarctic Polar Front (fig. 2). Surface temperature drops markedly across this front, and as a result this region is characterised by frequent fogs. The Antarctic Polar Front delimits the Southern Ocean, and thus defines the area of ocean that can be called Antarctic. It forms the natural boundary of an Antarctic faunal zone, though being a mobile oceanographic feature it is perhaps more difficult to use than the simple latitudinal definitions adopted by many birders.

Of major biological significance to the South Georgia marine ecosystem is the area to the northeast of the island where the relatively warmer waters of the Antarctic Circumpolar Current meet colder waters that originate in the Weddell Sea to the south and southeast of the island. Biological productivity is further enriched by favourable oceanic conditions created at the edge of the continental shelf, where depths drop rapidly to over 3,000 m. The continental shelf itself is relatively wide, extending for 50–150 km from the island. The shelf is mostly less than 200 m deep, except for the deep submarine canyons, which are the offshore extensions of many of the glaciated fjords on the island. The South Georgia marine system is very rich biologically. Not only do the prevailing currents carry substantial quantities of Antarctic Krill *Euphausia superba* to the area, but the seas also support significant local production. The rich seabird populations of South Georgia are thus related to a suite of characteristics: an extensive area of suitable breeding habitat, an abundant local supply of food for species foraging close to the island, but with ready access to other rich feeding areas such as the Patagonian Shelf, the Falklands Current, and even the Benguela upwelling and the Scotia and Weddell Seas for those species able to undertake longer foraging trips.

A brief history of South Georgia

As with so many isolated islands, we will probably never know who first sighted South Georgia. It is possible that it was seen as early as the sixteenth century from sailing ships blown off course by storms while making the perilous rounding of Cape Horn, but the first sighting on record was made by a London merchant, Antoine de la Roché, in April 1695 (Headland 1984). The next sighting was probably made by French merchants aboard the Spanish ship *Léon*, which was also blown off course, in 1756. The island was named Isla de San Pedro (or Île de St Pierre) after the saint's feast day. Both its mountainous nature and its abundant wildlife were noted.

Two decades later, South Georgia was mapped and explored by Captain James Cook on the second of his three voyages on HMS *Resolution*. The first sighting was by Midshipman Willis on 14th January 1775, and the next day Cook saw and named Bird Island 'on account of the vast numbers that were upon it'. Three days later *Resolution* hove to at the entrance to what is now Possession Bay on the north side of the island. Cook lowered a small boat and went ashore with a midshipman and three naturalists (John Forster, George Forster and Anders Sparrman). The landing was probably in Prince Olav Harbour; here Cook took possession of the island in the name of King George III with a display of flags and discharge of firearms. Although Cook was famously unimpressed with South Georgia, his account of the voyage, published in 1777, described the large numbers of seals to be found there and thus triggered the first wave of exploitation of the island's natural resources.

Although the coastline of South Georgia had soon been relatively well charted by whalers and others, the interior was largely unknown. This was rectified by the four expeditions of the South Georgia Surveys (1951/52, 1953/54, 1955/56 and 1956/57) under the leadership of Duncan Carse.

Detailed scientific work on South Georgia started with the occupation of a research station in Royal Bay by the German International Polar Year Expedition in 1882–83, which was the first scientific party to overwinter on the island. From 1925 to 1931 the *Discovery* Investigations occupied a laboratory (Discovery House) on King Edward Point. The scientific staff made anatomical investigations of whale carcases brought into Grytviken as part of a wider, long-term study of whale populations and the ecology of the

Southern Ocean that had the ultimate objective of providing a basis for the sustainable harvesting of whales (Hardy 1967).

The British Antarctic Survey (BAS) established a scientific research station at King Edward Point in 1969, working initially from the old *Discovery* Investigations building. A detailed study of Antarctic Fur Seals *Arctocephalus gazella* and seabirds had started previously on Bird Island in the 1950s and BAS research on Bird Island was started as a summer-only operation in 1971. A year-round station was built in 1983 and has been in continuous operation ever since.

In 1908 South Georgia was included within the Falkland Islands Dependencies and a resident magistrate took office at Grytviken to oversee the whaling industry that was now subject to regulation and taxes by the Falkland Islands Government. The magistrate moved to nearby King Edward Point in 1912. British government of South Georgia was interrupted by the occupation by Argentine forces for 22 days in 1982, after which a British garrison was established at King Edward Point. South Georgia and the South Sandwich Islands became a British Overseas Territory in 1985, and in 2001 the military garrison was replaced by the BAS.

The history of South Georgia is described by Headland (1984), Burton (1996) and Poncet & Crosbie (2005).

Exploitation of South Georgia

South Georgia has a long history of exploitation by humans, and has had the longest period of continuous human habitation of all the subantarctic islands. The hunting of Antarctic Fur Seals and Southern Elephant Seals *Mirounga leonina* started just over a decade after Cook's voyage, with the arrival of the British vessel *Lord Hawkesbury* in 1786. The first American sealing vessels arrived in 1792, and in the 1800/01 season 17 sealing vessels took a record 112,000 pelts of Antarctic Fur Seals from South Georgia alone. Exploitation was so intense that by 1835 the industry collapsed through overharvesting. Residual hunting continued and, by the time of the visit of zoologist Robert Cushman Murphy, on the American whaling brig *Daisy* in 1912/13, the Antarctic Fur Seal was believed to have been hunted almost to extinction. In the 1930s, small numbers were found breeding on Bird Island (Bonner 1968). For many years the population remained at very low levels, but in the second half of the twentieth century the population recovered spectacularly (Boyd 1993), possibly aided by an increased availability of Antarctic Krill following the exploitation of the great whales. The Antarctic Fur Seal has thus gone from being one of the rarest large wild mammals to one of the most abundant on the planet.

Southern Elephant Seals were also hunted, but for their oil rather than skins. As with Antarctic Fur Seals, hunting was initially completely unregulated. In 1904, the newly established whaling station at Grytviken started elephant-sealing as a sideline and regulation by quotas and a close season was introduced in 1909. A scientific study in 1952 by the Falkland Islands Government Sealing Inspector, Richard Laws, established a sustainable harvesting regime which continued until the closure of the whaling station. It remains a rare example of the rational use of living resources in an otherwise depressing catalogue of commercial exploitation. It has often been stated that King Penguins *Aptenodytes patagonicus* were also exploited for oil at South Georgia, based essentially on comments by Harrison Matthews (1931) and Murphy (1948), and it has long been assumed that the local population is recovering from a historical low level caused directly by this exploitation. While King Penguins undoubtedly were exploited elsewhere, notably at Heard Island, the evidence that there was extensive exploitation at South Georgia remains frustratingly anecdotal.

Shore-based whaling started in November 1904 (plate 74), and continued until December 1965. At the peak there were six whaling stations operating on South Georgia. In 1925/26, the advent of pelagic whale factory ships, in which carcases could be drawn onto the deck for processing, liberated the whaling companies from restrictions and taxes imposed by the Falkland Islands. The result was a sharp increase in the exploitation of baleen whales and a reduction in stocks. The first species to suffer a decline in numbers was the Humpback Whale *Megaptera novaeangliae*. This was followed by

British Antarctic Survey

74. A shoreline at South Georgia littered with whalebones emanating from the earliest days of shore-based whaling, when carcases were flensed on the shore.

Blue *Balaenoptera musculus* and Fin Whales *B. physalus*; numbers of both species recovered somewhat during the Second World War, but following the resumption of whaling, first the fishery for Blue Whales then Fin Whales collapsed. Attention was then directed to the smaller Sei Whale *B. borealis*, until this too was reduced in numbers. Whaling from shore stations on South Georgia eventually became economically unviable, and the last whaling station on South Georgia, Leith Harbour, closed in December 1965. Pelagic whaling continued, however, and the industry finally turned to harvesting the smallest of the rorqual whales, the Antarctic Minke Whale *B. bonaerensis*.

The whaling stations are now derelict and out of bounds to visitors because of health and safety considerations. To address these issues at Grytviken, the South Georgia Government undertook a programme of building removal there in 2003 and 2004; now, apart from the church and a few buildings, including the South Georgia Museum (previously the manager's villa), only the rusting machinery stands.

Fishing started in the late 1960s with Soviet and Eastern Bloc vessels taking Antarctic Krill and Marbled Rock-cod *Notothenia rossii*. Stocks of the latter rapidly became depleted and the population has yet to recover. Fishing activity has continued, though regulated by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) since 1982. Current fisheries around South Georgia are longlining for Patagonian Toothfish *Dissostichus eleginoides*, mid-water trawling for Mackerel Ice-fish *Champsocephalus gunnari* and Antarctic Krill, and experimental pot-fishing for anomuran crabs. Fishing vessels are licensed, and Total Allowable Catches (TACs) set by CCAMLR are enforced within the 200-nautical-mile South Georgia Maritime Zone. Measures to prevent albatrosses and other seabirds being caught on longlines are mandatory.

The influence of humans on land has been predominantly through the introduction of alien fauna and flora. Reindeer *Rangifer tarandus* were introduced by the whalers as a source of food. There were two separate introductions: Ocean Harbour and Stromness Bay in 1911, and a repeat introduction at Stromness Bay in 1925 after the original animals all died in an avalanche (Leader-Williams 1988). There are now two populations, one ranging from the Barff Peninsula to Royal Bay and the other inhabiting most of the Lewin (Busen) Peninsula, including Stromness Bay and

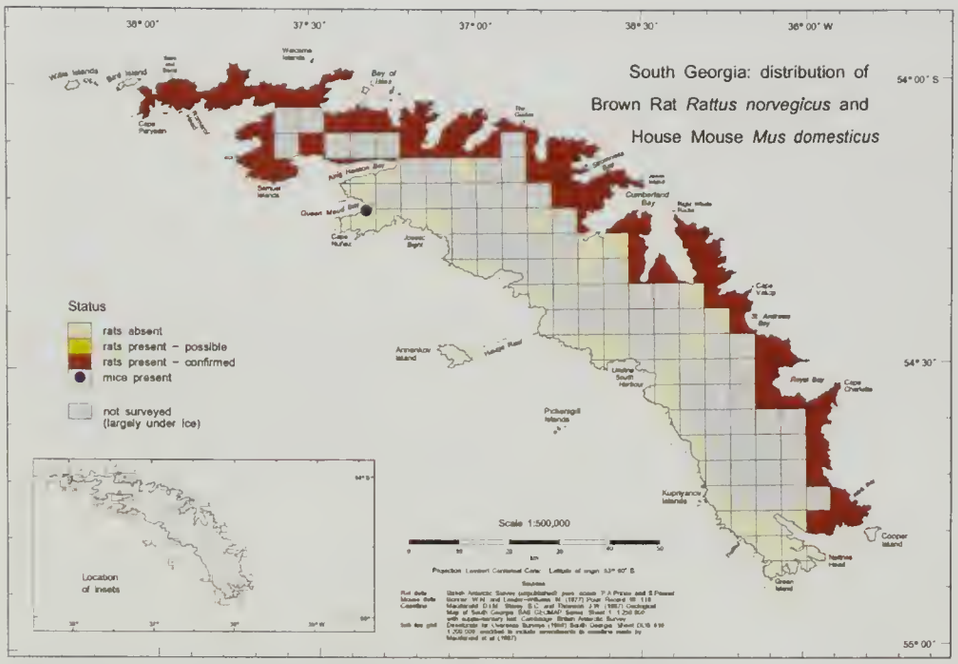


Fig. 3. Distribution of Brown Rat *Rattus norvegicus* and House Mouse *Mus domesticus* on South Georgia. Reproduced with permission from Trathan *et al.* (1996).

Fortuna Bay. The total population is currently unknown but is probably around 3,000 animals, and both the flora and the landscape have been extensively modified by their activities. In particular, they have overgrazed the extensive coastal stands of Tussac Grass *Poa flabellata* and Greater Burnet *Acaena magellanica*, together with various species of lichen, and their selective grazing habits have encouraged the spread of the introduced Annual Meadow-grass *Poa annua*.

Horses, sheep, pigs, cats, dogs and other domestic animals were kept at the whaling stations but are no longer present and none is known to have caused any significant environmental impact. In contrast, the environment of large areas of South Georgia has been modified by the introduction of the Brown Rat *Rattus norvegicus*. Rats are thought to have been introduced accidentally by sealing vessels in the late 1700s, and now occupy virtually the entire northeast coastline and the northern quarter of the southwest coast (fig. 3). In rat-infested coastal areas, South Georgia Pipits *Anthus antarcticus* and the smaller burrowing petrel species have been eliminated, while populations of both White-chinned Petrels *Procellaria aequinoctialis* and South Georgia (Yellow-billed) Pintails *Anas georgica georgica* have been greatly affected.

It is not known when or how the House Mouse *Mus domesticus* was introduced. Until recently, mice were known from four locations: the north and south shores of Shallop Cove, Holmestrand and Cape Rosa. The areas now designated as mouse-infested are the entire Nuñez Peninsula and the coast from Shallop Cove to Cape Rosa to the south coast of King Haakon Bay. In areas where mice are present, populations of South Georgia Pipit appear to be significantly lower than in similar, mouse-free parts of the island.

The terrestrial environment

South Georgia's high-altitude, glaciated interior, together with its position south of the Antarctic Polar Front and surrounded by cold Antarctic waters, results in a cooler oceanic climate than characterises most other subantarctic islands, and a harsher climate than would be expected from its latitude alone. The mountainous nature and complex topography of the island mean that the weather can change rapidly and also differs greatly in adjacent fjords. The orographic effects of the island's central mountain ranges greatly influence regional precipitation and weather. The southwest side and the extremities of the island, being exposed to the prevailing westerly weather systems, are typically cold, wet and cloudy with strong winds. The northeast coastal areas are more temperate, being sheltered by the mountain ranges and local topography. Here, the average annual precipitation is 1,600 mm, annual wind speed is 4.4 m per second, and mean annual temperature is +2°C with an absolute range of -19°C to +24°C. Winter and summer seasons are clearly defined, with mean temperatures of +4.8°C in the summer and -1.2°C in winter with significant winter snowfall down to sea level. Föhn winds associated with passing frontal systems frequently

produce localised rapid increases in temperature (and may exceed 100 knots).

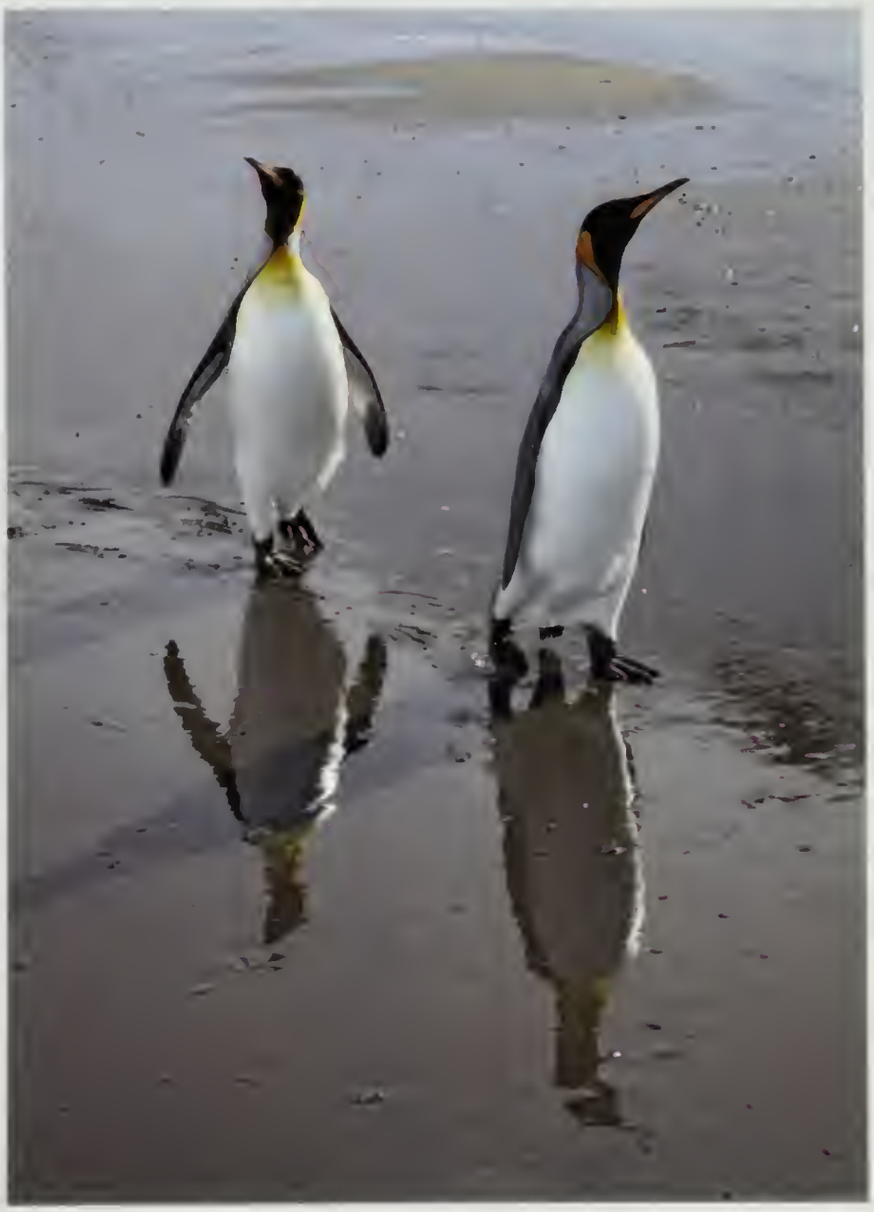
The terrestrial environment of South Georgia shows a strong altitudinal zonation, which has considerable importance for the distribution of breeding birds. At lower levels the vegetation can be lush, and in the natural state is dominated by Tussac Grass. Where Reindeer have been introduced, much of this tussac grassland is greatly reduced in extent by grazing, and survives only on the steeper slopes. In addition, where Antarctic Fur Seals come ashore to breed, the tussac grassland is also heavily eroded.

There are 24 species of vascular plants native to South Georgia, together with about 125 species of mosses, 80 of liverworts and 150 of lichens. There are no trees or shrubs, and only mosses and lichens survive in the inland rock and ice environment. There are over 50 naturalised introduced vascular plant species, which occur mostly around the old whaling stations.

Extensive areas of vascular vegetation are confined principally to low-altitude coastal areas and offshore islands, islets and stacks, where the landscape is dominated by tussac grassland, which extends from sea level to a maximum altitude of 200 m on the south coast and 400 m on the north coast. *Festuca* grassland, dominated by Tufted Fescue Grass *F. contracta*, is widespread up to 200-m altitude on coastal areas of the central north coast, and stands of Greater Burnet occur most frequently in sheltered damp tussac grassland but are absent in grazed areas. Mire and bog communities dominated by Greater Rush *Juncus scheuchzeroides* and Brown Rush *Rostkovia magellanica* occur wherever there are seepage slopes, streams and springs. Fellfield communities consisting of scattered mosses, lichens and various vascular plants occur on dry stony ground in exposed windswept sites on the coast and on inland plateaux and mountain ridges. There are no indigenous terrestrial mammals, reptiles, amphibians or freshwater fish. The terrestrial and freshwater invertebrate fauna is limited in terms of numbers and species diversity. It includes flies, beetles, springtails, mites, ticks, spiders, annelid worms and a land snail.

A history of the ornithology of South Georgia

The South Georgia avifauna was reviewed by a number of biologists from early expeditions and summarised by Harrison Matthews



Andrew Clarke

75. The King Penguin *Aptenodytes patagonicus* was one of the first species to be the subject of detailed study at South Georgia.

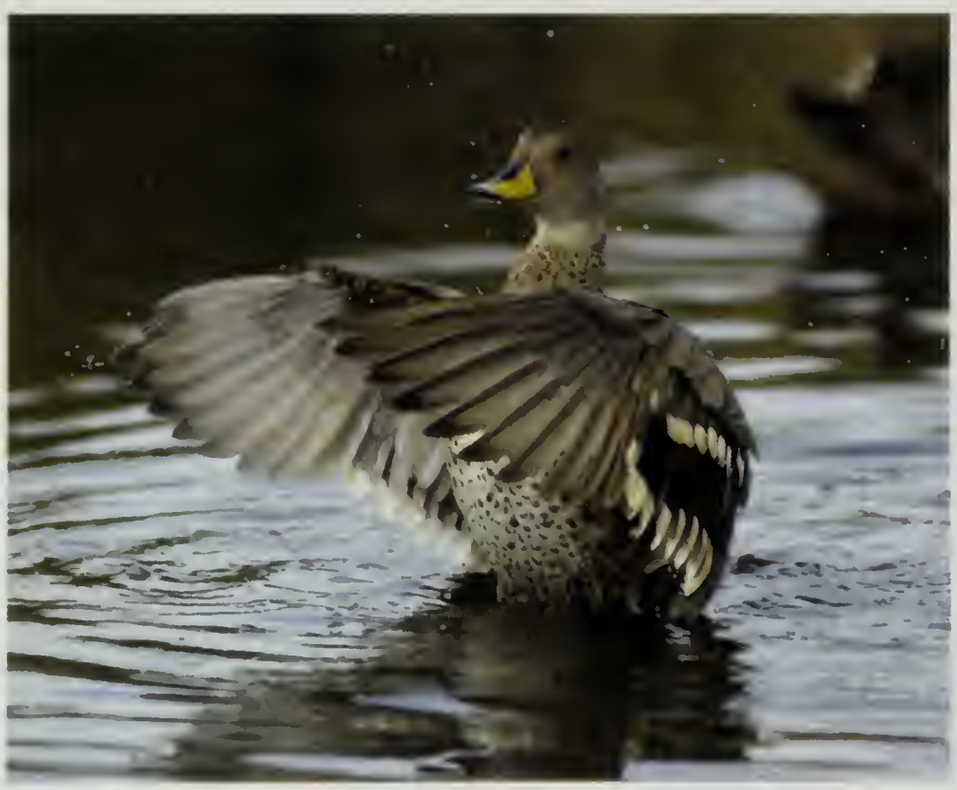
(1929), but the first major study of South Georgia seabirds was that by the American ornithologist Robert Cushman Murphy, who visited the island aboard the whaling brig *Daisy* in 1912–13. This work contributed to the seminal *Oceanic Birds of South America* (Murphy 1936), and was portrayed delightfully in letters written back to his newly-wed wife and published as *Logbook for Grace* (Murphy 1948).

A number of subsequent visitors to the island recorded ornithological observations (e.g. Rankin 1951) and Bernard Stonehouse studied the breeding of King Penguins (plate 75) from October 1953 to December 1954 at the Bay of Isles. The next period of ornithological research ashore on South Georgia was that by USARP (United States Antarctic Research Program)-funded scientists, led by Lance Tickell, on albatrosses at Bird Island between 1958 and 1964. This work established the basis for the first long-term studies of the seabird populations of South Georgia, and some of the birds ringed then are still breeding on Bird Island today. Bird Island was reoccupied by scientists from the BAS in 1971, and extensive ornithological work carried out every austral summer until 1981/82 (except 1974/75). The conflict with Argentina led to the evacuation of the station and cessation of scientific work between April and September 1982, since when ornithological research has continued uninterrupted.

Although ornithological work on South Georgia has concentrated on Bird Island, a number of all-island surveys of breeding seabirds have been carried out, notably albatrosses in 1986/87, 1987/88 and 2003/04; giant petrels in 1986/87, 1987/88, 2005/06 and 2006/07; and White-chinned Petrels in 2005/06 and 2006/07. The British Antarctic Survey's South Georgia Breeding Birds Survey, which operated from 1985 to 1988, resulted in the first island-wide bird population estimates. Co-ordinated by Peter Prince, the fieldwork was conducted from the yacht *Damien II*, with landings at hundreds of sites around the island. Additionally, Sally Poncet, working from the yachts *Damien II* and *Golden Fleece*, has recorded breeding birds throughout the island from the 1970s to the present day.

During the past 25 years, there have thus been major advances in our knowledge of the distribution of all bird species on South Georgia. We now have reasonable estimates for the abundance of most of the larger species such as albatrosses and penguins, yet for many of the rest we know no more than we did 40 years ago. This applies in particular to the smaller petrels, and especially the burrowing petrels, for which the best data are often those summarised by Prince & Payne (1979).

Over the period that ornithological work has been undertaken on Bird Island, ornithologists and others have recorded seabirds at sea around South Georgia, with records from BAS and its predecessor (the Falkland Islands Dependencies Survey, FIDS) going back to 1959.



Tony Martin

76. The endemic South Georgia race of the Yellow-billed Pintail *Anas georgica*.

Table 1. Breeding birds of South Georgia. The figures for breeding population are rounded, and the date is of the most recent census or estimate. Note that occasional breeders (Adélie Penguin, Southern Rockhopper Penguin, White-capped Albatross) have not been listed; these are shown in table 2. Note that for species where only part of the population breeds each year (King Penguin, Wandering Albatross, Grey-headed Albatross and Light-mantled Albatross) the census data are uncorrected for non-breeding birds. nd: no data. IUCN abbreviations: LC: Least Concern; NT: Near Threatened; VU: Vulnerable; EN: Endangered. Scientific names appear in the text.

Species	Estimated breeding population (pairs)	Date of most recent census or estimate	Percentage of world population (estimated)	IUCN status
Yellow-billed Teal	<20	2011	nd	LC
South Georgia Pintail	6,000	2011	nd/endemic	LC
King Penguin	>450,000	2002	45	LC
Gentoo Penguin	105,000	1996	30	NT
Chinstrap Penguin	12,000	1987	<1	LC
Macaroni Penguin	<1,000,000	2005	20	VU
Wandering Albatross	1,550	2004	12	VU
Light-mantled Albatross	5,000	1976	20	NT
Grey-headed Albatross	47,700	2004	40	VU
Black-browed Albatross	74,300	2004	12	EN
Southern Giant Petrel	8,700	2007	15	LC
Northern Giant Petrel	17,200	2007	45	LC
Cape Petrel	10,000	2010	1	LC
Snow Petrel	3,000	1983	<1	LC
Blue Petrel	70,000	1983	5	LC
Antarctic Prion	22,000,000	1983	>85	LC
Fairy Prion	1,000	1983	<1	LC
White-chinned Petrel	900,000	2008	50	VU
Wilson's Storm-petrel	600,000	1983	5–10	LC
Grey-backed Storm-petrel	Unknown (<100)	2004	nd (<1)	LC
Black-bellied Storm-petrel	10,000	1983	40	LC
South Georgia Diving Petrel	2,000,000	1983	30	LC
Common Diving Petrel	3,800,000	1983	50	LC
Imperial Shag	10,300	1987	<5	LC
Snowy Sheathbill	2,000	1983	20	LC
Kelp Gull	2,000	1983	<1	LC
Antarctic Tern	2,500	1983	15	LC
Brown Skua	2,000	1983	10–20	LC
South Georgia Pipit	3,000	1983	endemic	NT

During this period, non-breeding visitors and vagrants were also recorded, and an informal database maintained by BAS. This, together with previous records compiled in the Antarctic Map Folio Series (Watson *et al.* 1971), was used as the basis for the summaries of the South Georgia avifauna by Prince & Payne (1979) and Prince & Croxall (1983, 1996). Since then the number of observers in the South Georgia area has increased dramatically with ship-based tourism, but in the absence of a system for documenting these observations, most of these sightings remain unreported or unavailable for review.

The breeding birds of South Georgia

The current status of the 29 species known to be breeding regularly on South Georgia is

We use the taxonomic sequence recommended by the IOC (Gill & Wright 2006). For the taxonomy and nomenclature of species whose breeding range is primarily South American, we follow the South American Classification Committee (SACC) (www.museum.lsu.edu/~Remsen/SACCBaseline.html). For other species, we follow BirdLife International (www.birdlife.org/datazone/species/).

Tony Martin

77. Part of the St Andrews Bay King Penguin colony showing adults incubating eggs (foreground) with young at the 'teddy bear' stage gathering in the background.

shown in table 1. Species that have bred only occasionally, non-breeding visitors and vagrants are covered in the next section.

There are two species of waterfowl resident on South Georgia. The South Georgia (Yellow-billed) Pintail (plate 76) is found almost anywhere where there are coastal pools surrounded by vegetation. It is an endemic subspecies (*A. g. georgica*) (previously, and perhaps correctly, considered as a full species). South Georgia Pintails are gregarious and groups of up to 80 may be found on favoured pools in summer; larger groups may form on the coast in winter when many pools freeze up. They feed mainly in streams and the intertidal zone, though they may scavenge on seal carcases. Based on counts made during the 2005/06 and 2006/07 surveys, together with mark/recapture work in Cumberland Bay, the total breeding population is estimated to be around 6,000 pairs.

The Yellow-billed (Speckled) Teal *Anas flavirostris* was first discovered on South Georgia in 1971, when 40–50 were counted at various locations in Cumberland East Bay (Weller & Howard 1972). Despite extensive searching, none were seen elsewhere in that season. Since then this species has been encountered in small numbers in other coastal locations around South Georgia, though it is nowhere common and the present breeding population is probably less than 20 pairs. The origin of this population is unknown: Weller & Howard (1972) speculated that a small population may have been introduced to the Cumberland East Bay area by whalers, but it is now believed that the South Georgia population is maintained by immigration from South America (Prince & Croxall 1983).

At some locations, the habitat for both of these species has been affected by increasing numbers of Antarctic Fur Seals, and the resultant eutrophication of coastal pools and destruction of the tussac at low elevation. To what extent this has affected the population of the two duck species is unknown.

Four species of penguin breed regularly on South Georgia. The King Penguin is one of the island's iconic species, with large and spectacular colonies at several sites. From a population estimated to be only a few thousand pairs in the nineteenth century, this species is now doing well on South Georgia, as on other subantarctic islands. It is often assumed that the previously low population reflected widespread exploitation, but evidence for that on South Georgia is hard to obtain. The population is increasing and new colonies have been founded recently. The largest colonies are at St Andrews Bay (150,000 pairs), Salisbury Plain in the Bay of Isles (60,000 pairs), Royal Bay (30,000 pairs)

and Gold Harbour (25,000 pairs). The South Georgia population now almost certainly exceeds the previous estimate of 450,000 pairs (Poncet & Crosbie 2005).

The King Penguin has an unusual breeding cycle. A single egg is laid, and chick rearing takes 14–16 months. As a consequence, a pair breeding successfully in one year will follow this with a later breeding cycle in the next, and then skip a year before starting another early season breeding cycle, i.e. a successful pair will breed in two years out of three. Consequently, visitors to a colony will be met with both very young chicks, perhaps still being brooded, and older chicks that have gathered in a crèche and may even be moulting into adult plumage (plate 77).

The Gentoo Penguin *Pygoscelis papua* is common on South Georgia, with small colonies all around the coast and an estimated total population of 105,000 pairs (Trathan *et al.* 1996). Colonies can be up to several hundred metres inland, and the birds may shift the location of the colony by hundreds of metres between years. The Gentoo Penguin is heavily dependent upon Antarctic Krill for successful breeding. Changes in oceanographic and sea-ice conditions along the western Antarctic Peninsula, where krill spawn, and in the wider Scotia Sea influence the availability of krill for the seabirds and marine mammals of South Georgia. In years of good krill availability, Gentoos may raise two chicks; when krill is less abundant, they may raise only one chick, or in extreme cases (once or twice a decade) may fail entirely.

South Georgia is the centre of the world population of the Macaroni Penguin *Eudyptes chrysolophus*, which breeds locally all around the coast on steep rock or tussac slopes. The largest colonies are on the north coast, notably on Bird Island and the Willis Islands. The South Georgia population may have been as large as 2.7 million pairs in the late 1970s (Prince & Croxall 1983). The population had been reduced by half in the 1990s and may now number fewer than one million pairs (Trathan *et al.* in press). The cause of this decline is unclear; it may result from competition for food with the rapidly expanding population of Antarctic Fur Seals and/or oceanographic changes leading to a reduction in the supply of Antarctic Krill.

The fourth species of penguin on South Georgia is the Chinstrap Penguin *P. antarcticus*. South Georgia is at the northern edge of this species' range, and the few colonies are all on the (colder) southern or

Tony Martin

78. Perhaps the iconic species of South Georgia, Wandering Albatross *Diomedea exulans*, displaying on Bird Island, South Georgia.

southeastern coasts; the South Georgia population is estimated at 12,000 pairs.

The other group of iconic South Georgia birds are the albatrosses, of which four species breed. The Wandering Albatross *Diomedea exulans* (plate 78) is the largest seabird in the South Georgia region, and the only great albatross (*Diomedea* sp.) breeding there. It is seen commonly following ships, and watching one of these birds in a strong wind is one of the great sights in birding. Breeding is confined to about 25 locations in the northwest of South Georgia, Annenkov Island, and a handful of sites in the southeast. The species has a circumpolar breeding distribution with large populations at three other island groups besides South Georgia (Îles Crozet, Îles Kerguelen and Prince Edward Islands) and a very small population on Macquarie Island. It ranges over huge distances during the non-breeding season, and both adults and immature birds can be found all over the Southern Ocean and as far north as 25°S. Chick rearing takes about nine months, and successful pairs will thus breed biennially. The population at Bird Island has been monitored continuously for over 35 years, and with intermittent population data prior to this and annual censuses of the Bay of Isles populations since 1999, there is a clear picture of population trends. The South Georgia population was estimated to be 4,283 pairs in 1979 (Croxall 1979) but only 1,553 pairs in 2003/04 (Poncet *et al.* 2006). This population is now known to be declining rapidly, at a rate of about 4% per annum since the late 1990s, caused principally by incidental mortality in longline fisheries.

The beautiful and charismatic Light-mantled Albatross *Phoebetria palpebrata* (plate 79) breeds along much of the coast of South Georgia in isolated pairs and small loose breeding groups on steep tussac slopes and cliff ledges that allow easy access. It is fairly common at sea all around the island, and has an engaging habit of riding the updraft alongside the superstructure of ships, affording opportunities for close views. During the breeding season, pairs of birds perform tandem aerial displays, gliding to and fro along the nesting cliffs. Breeding birds can be encountered far inland, away from most other wildlife on South Georgia; on calm days their characteristic mournful call might be the only sound audible, and is one of the most evocative wildlife experiences that South Georgia has to offer. Adults undertake longer foraging trips and feed farther south during chick rearing than do other albatrosses on South Georgia, travelling to the southern edge of the Scotia Sea and even into the marginal

Tony Martin

79. Light-mantled Albatross *Phoebetria palpebrata* on the nest.

ice zone of the Weddell Sea. The scattered nature of the breeding population makes this a difficult species to survey. There has never been a comprehensive survey, and the only population estimate, based on extrapolation from the number of nests recorded on a 60-km stretch of coastline in 1976, is 5,000 pairs. During the last decade, a small monitoring area on Bird Island suggested that the population is broadly stable, although the numbers breeding vary greatly from year to year. Non-breeders from the South Georgia population remain predominantly in polar and subpolar waters of the South Atlantic.

Two species of smaller albatross, traditionally referred to by the old sailor's term 'mollymawk', breed on South Georgia. The Grey-headed Albatross *Thalassarche chrysostoma* breeds in nine areas of the northwest, with the largest colonies on Bird Island, the Willis Islands and Paryadin Peninsula. Breeding adults feed in the Antarctic Frontal Zone and as far south as the southern boundary of the Scotia Sea. The breeding cycle is long, and successful pairs nest biennially. After breeding, some birds stay in the southwest Atlantic, some travel as far as the southwest Indian Ocean and some undertake one or two complete circumpolar migrations before returning to South Georgia to nest (Croxall *et al.* 2005). The most recent complete population census, in 2003/04, revealed 47,670 breeding pairs (Poncet *et al.* 2006). This species has a local but circumpolar breeding distribution at subantarctic islands, and at Diego Ramirez Islands, in southern Chile. South Georgia supports 40% of the world population, however, and monitoring studies at Bird Island have revealed a decline of >2% per annum (Poncet *et al.* 2006). Grey-headed Albatrosses are much less frequently reported as bycatch in longline fisheries than many other albatrosses, so this decline may partly reflect a long-term shift in food availability.

The Black-browed Albatross *T. melanophris* breeds more widely on South Georgia than does the Grey-headed, with colonies in

Tony Martin

80. Southern Giant Petrel *Macronectes giganteus*. Males of this species are major scavengers of seal carcases, whereas females feed at sea.

Andrew Clarke

81. Snow Petrel *Pagodroma nivea* on its nest under a boulder, high on Mt Hodges, South Georgia.

James Lidster

82. Blue Petrel *Halobaena caerulea*. This species was first found on mainland South Georgia in 1971, but is now known to breed widely across the island. It is also regularly seen at sea and ventures far south into the cold waters of the marginal ice zone.

James Lidster

83. Antarctic Prion *Pachyptila desolata*. South Georgia is the global stronghold for this species, with a breeding population estimated at 22 million pairs.

about 15 locations in the northwest, but also in the southeast at Annenkov, Cooper and Green Islands. The most recent census suggested a breeding population of 74,290 pairs in 2003/04 (Poncet *et al.* 2006). Monitoring work on Bird Island has revealed a sharp decline of about 3–4% per annum, resulting mainly from incidental mortality in longline and trawl fisheries. During the non-breeding period most South Georgia birds migrate to the Benguela Current upwelling off southwest Africa, although some move to the Patagonian Shelf and others to Australasia. It is during this non-breeding period that the birds are most critically exposed to incidental mortality from fisheries operations. The species has a circumpolar breeding distribution, and South Georgia supports around 12% of the world population.

The Southern Giant Petrel *Macronectes giganteus* (plate 80) nests in small, widely scattered, loose colonies all around South Georgia. The Northern Giant Petrel *M. halli* breeds earlier than *giganteus*, with the entire breeding cycle about six weeks ahead. In both species the males forage on beaches, typically taking carrion from seal colonies, whereas the females forage widely at sea. The best estimate of the South Georgia populations, based on recent fieldwork, is c. 8,700 pairs of *giganteus* and c. 17,200 pairs of *halli* (Poncet *et al.* unpubl. data). Where they encounter humans, these species are particularly sensitive to disturbance during the breeding cycle. Although both have circumpolar breeding distributions, *halli* has a smaller global population than *giganteus*, and almost half the world population is found on South Georgia.

The appearance of the attractive and very distinctive Cape Petrel *Daption capense* in the wake is often the first sign that a ship is

approaching the Southern Ocean. Cape Petrels are common at sea around South Georgia, and c. 10,000 pairs nest on ledges and in crevices at scattered sites all around the island. The Snow Petrel *Pagodroma nivea* (plate 81) is at the northern limit of its breeding range on South Georgia, where it tends to nest in inaccessible crevices high in mountains. This makes it difficult to census and the best estimate of the South Georgia population is c. 3,000 pairs (Prince & Croxall 1983). It is seen reasonably commonly at sea around the island, especially when pack-ice is present.

Although long-known from the waters all around South Georgia, where it is seen commonly, the Blue Petrel *Halobaena caerulea* (plate 82) was not found on land until 1971. Soon afterwards, breeding sites were located in tussac slopes on Bird Island, and it is now known to breed widely on the south coast and offshore islands, where rats are absent. The South Georgia population was estimated at 70,000 pairs by Prince & Croxall (1983). Blue Petrels breed on most subantarctic islands, and also in southern Chile.

Two species of prion breed on South Georgia. The Antarctic Prion *Pachyptila desolata* (plate 83) is abundant, and huge numbers can be seen in flight or in rafts on the sea near colonies in the evening. It breeds in a wide range of habitats including tussac, *Festuca* grassland, fellfield and boulder scree. The South Georgia population was estimated at 22 million pairs in the 1980s, out of a total world population of 25 million pairs. The Fairy Prion *Pachyptila turtur* nests locally in rock crevices on boulder beaches, and can often be seen at sea close to shore in the daytime, when Antarctic Prions are usually farther offshore. The South Georgia population is small, perhaps 1,000 pairs (British Antarctic Survey unpubl. data), but it is a very common breeder on subtropical and subantarctic islands in the Indian and Pacific Oceans.

The White-chinned Petrel is a conspicuous species, seen commonly at sea around South Georgia and with a marked propensity to follow ships. It nests extensively in tussac grass and on offshore islands. The South Georgia population was originally estimated at around two million pairs (Prince & Croxall 1983), but a substantial (c. 30%) decline had occurred on Bird Island by the late 1990s (Berrow *et al.* 2000) and measurements of breeding density from surveys in 2005/06

Tony Martin

84. Wilson's Storm-petrel *Oceanites oceanicus*, feeding close to shore among fronds of kelp *Macrocystis pyrifera*.

and 2006/07, coupled with an estimate of the total area of suitable habitat, suggested a total of 670,000 occupied nests and a total breeding population of 900,000 pairs (Martin *et al.* 2009). This species suffers extensively from incidental mortality in fisheries, and its breeding habitat may also have been reduced and/or degraded by trampling from the increasing population of Antarctic Fur Seals; data from Bird Island suggest that this species continues to decline at around 2% per annum.

Three storm-petrels nest on South Georgia, of which the commonest by far is Wilson's Storm-petrel *Oceanites oceanicus* (plate 84). This small petrel breeds abundantly on the island, mostly in rocky scree crevices but also in moss banks and adjacent areas of sparse vegetation. The South Georgia population was estimated at 600,000 pairs by Prince & Croxall (1983); there have been no recent surveys but the population is clearly substantial. The small and dainty Grey-backed Storm-petrel *Garrodia nereis* is seen only infrequently at sea around South Georgia, and is most often encountered feeding around patches of floating kelp *Macrocystis pyrifera*. Very few breeding records exist and the population is unlikely to exceed a hundred pairs. The Black-bellied Storm-petrel *Fregetta tropica* is encountered far less frequently than Wilson's Storm-petrel at sea around South Georgia. It is a rare breeder on Bird Island and has been recorded breeding at only a few other mainland sites. Despite the widespread availability of apparently suitable breeding habitat (mainly on steep tussac slopes), the total South Georgia population probably numbers fewer than 10,000 pairs (Prince & Croxall 1983).

Two diving petrels breed on South Georgia. Both are common, and both can be seen in large numbers offshore from colonies in the evening; and they are extremely difficult to distinguish at sea. The South Georgia Diving Petrel *Pelecanoides georgicus* nests in long burrows dug into fine scree, and hence often at considerable altitude. Based on crude extrapolations from detailed surveys on Bird Island, the South Georgia population was estimated at two million pairs (Croxall & Hunter 1982). The species breeds on Annenkov Island at similar densities to those on Bird Island. Both of these islands are rat-free, but elsewhere most colonies are small and in rat-infested areas, and so the total population may be less than the extrapolated figure. The Common Diving Petrel *P. urinatrix* is also a common breeder, nesting in steep tussac slopes rather than scree. The South Georgia population has been estimated at 3.8 million pairs (Prince & Croxall 1983), about half the estimated global population.

The Imperial Shag *Phalacrocorax atriceps* is the only species of cormorant recorded from South Georgia, and it is widely distributed around the island. It nests among tussac clumps on cliff faces or on steep slopes overlooking the sea. It is restricted to inshore waters, where it can often be seen fishing cooperatively in large rafts. The South Georgia population is estimated at 10,300 pairs (Poncet & Crosbie 2005). The taxonomy of the Southern Ocean shags remains controversial and unresolved. The IOC (Gill & Wright 2006) gave species status to the South Georgia shag (as *Leucocarbo georgicus*) but BirdLife (and others) are reverting to the

John Loines

85. Two Antarctic Terns *Sterna vittata*.

earlier treatment until the taxonomic status of the numerous allopatric taxa in this group is clarified.

The Snowy Sheathbill *Chionis albus* is an ubiquitous attendee at seal beaches and penguin colonies. It breeds in small numbers all around South Georgia, and its population is estimated at 2,000 pairs. Elsewhere, it breeds south to 65°S on the Antarctic Peninsula, and many winter in the Falkland Islands and southern South America.

The Kelp Gull *Larus dominicanus*, the only gull breeding on South Georgia, where the population is estimated to be 2,000 pairs, is found sparsely all around the coasts. The diet is predominantly marine invertebrates, particularly the intertidal limpet *Nacella concinna*, and in some areas substantial middens of limpet shells have accumulated. Like all gulls, this species is highly adaptable and will take carrion, refuse and fishery waste when available. The only breeding tern is the Antarctic Tern *Sterna vittata* (plate 85), which nests in small colonies all along the coast, and sometimes far inland; its population is estimated at 2,500 pairs. The Brown Skua *Stercorarius antarcticus* is common at sea and breeds widely on South Georgia, although densities tend to be higher on offshore islands, possibly because chicks are predated by rats elsewhere. By far the largest breeding concentration is on Bird Island (470 pairs), probably reflecting the food supply from the high population of Antarctic Fur Seals there. The total South Georgia population is estimated to be 1,000–2,000 pairs.

The South Georgia Pipit (plate 86) is the only breeding passerine, and is endemic. Since it nests on or near the ground in tussac clumps, the eggs and young suffer heavy predation from Brown Rats, and the present breeding distribution is limited to about 20 rat-free offshore islands and some areas of the mainland southern coast that are isolated by glaciers from invasion by rats (fig. 4). Most birds winter along ice-free shorelines, and post-breeding dispersal may carry them into rat-infested areas. The population is believed to be around 3,000 pairs.

Rare and occasional breeders

In addition to the 29 species that breed regularly on South Georgia, three species have bred or attempted to breed. The Adélie Penguin *Pygoscelis adeliae* is mostly a very rare visitor to South Georgia; this is the most southerly of three pygoscelid penguins and its ecology is tied strongly to sea-ice. A single nest with eggs was reported in 1996, with a second pair attending an empty nest in the same year; while two pairs with nests (both empty) were found in 2006. With the current gradual shift southwards of the populations of all three pygoscelid penguins in response to climate change, Adélie Penguins will undoubtedly remain rare on South Georgia. Individual Southern Rockhopper Penguins *Eudyptes chrysocome* are recorded occasionally in Macaroni Penguin colonies. A few pairs bred in the 1980s but the species has reverted to the status of rare visitor, presumably associated with its widespread decline in

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86. The endemic South Georgia Pipit *Anthus antarcticus* is the only breeding passerine on South Georgia.

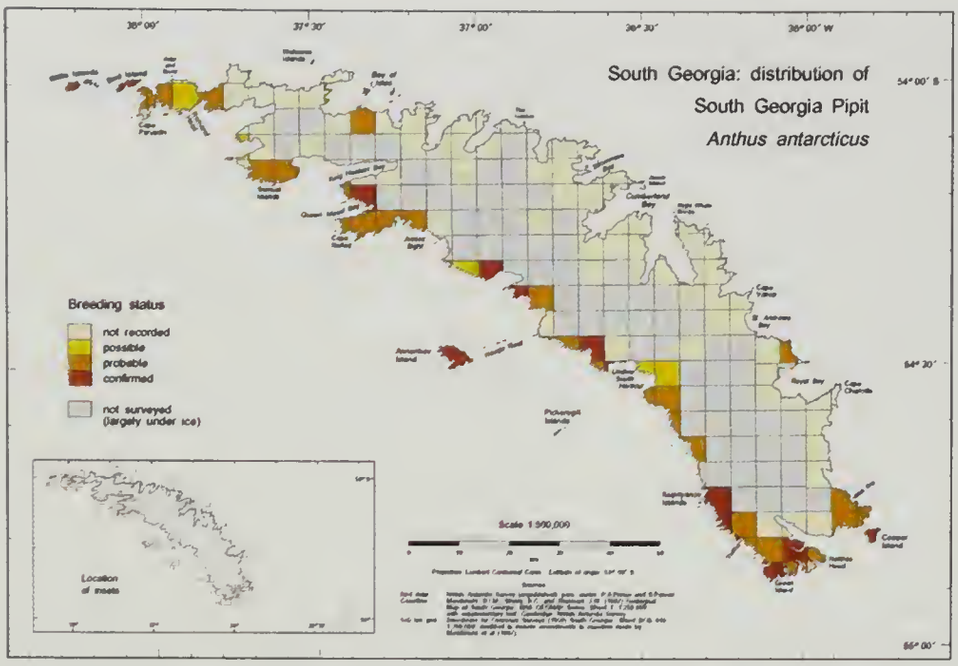

Fig. 4. Map showing the breeding distribution of the South Georgia Pipit, with breeding limited to areas free of Brown Rats (see fig. 3). Reproduced with permission from Trathan *et al.* (1996).

the Falklands and elsewhere. The White-capped Albatross *Thalassarche steadi* is generally a very rare visitor, presumably from the small population known to migrate regularly to temperate waters of the southwest Atlantic off Uruguay (Jiménez *et al.* 2009). However, a single male, first seen in 2002/03, has bred with a female Black-browed Albatross on Bird Island since 2007/08 and chicks were hatched in this and the following two seasons, one fledging successfully in 2009/10.

Non-breeding visitors and vagrants

Current knowledge of non-breeding visitors and vagrants to South Georgia is summarised in table 2. Most records of vagrants come from three main areas: Bird Island and King Edward Cove, where there is a year-round scientific presence, and from offshore waters visited by scientific and tourist vessels. From the early 1970s, a comprehensive database of vagrant and non-breeding birds on South Georgia was maintained at BAS, initially by Peter Prince, and this was kept going until the early 2000s. Table 2 includes those records known to the authors; although vagrants recorded ashore on South Georgia remain reasonably well documented, this is not the case for at-sea sightings and there will undoubtedly be many records from tourist and research vessels of which we are unaware.

The publication of the Antarctic Map Folio for birds (Watson & Harper 1971) and the first Antarctic field guide (Watson 1975) were landmarks which enabled a realistic appraisal of the status of seabirds seen in South Georgia waters. From the 1970s, BAS oceanographic work provided opportunities for extended periods of observation at sea over the continental shelf waters around the island. It was quickly established that Great *Puffinus gravis* and Sooty Shearwaters *P. griseus* were regular visitors to the area, including shelf waters. Both tend to be seen more frequently to the west of the island, notably in the area around Shag Rocks; Great Shearwaters breed to the north at Tristan da Cunha, and Sooty Shearwaters nest in large numbers in southern South America (with a few thousand pairs in the Falklands). In 1986 there was a notable influx of Great Shearwaters (and other less common species) to South Georgia waters, associated with a southerly movement of warm waters (Hunt *et al.* 1992), emphasising the powerful influence of oceanography on seabird distribution.

Slender-billed Prion *Pachyptila belcheri* also breeds in large numbers in the Falklands, and although a few corpses have been recorded on South Georgia, these have invariably related to skua predation, presumably of occasional visitors attending colonies of Antarctic Prions; there is still no evidence that the Slender-billed Prion breeds on South Georgia. This species has undoubtedly been overlooked around South Georgia because of the difficulty in separating it from Antarctic Prion at sea; while it is now clear that these species are largely separated ecologically by the Antarctic Polar Front, the finer details of distribution, migration and dispersal patterns remain unknown. Broad-billed Prion

Table 2. Occasional breeding species, visitors and vagrants to South Georgia. V: vagrant; OB: occasional breeder; NBV: regular but non-breeding visitor; SAV: ship-assisted vagrant; I: introduced and subsequently extirpated. For vagrants, the number of confirmed occurrences known to the authors, followed by the estimated number of individual birds involved where known, are shown in brackets; nd: data not known to authors. These totals include all records listed by Prince & Croxall (1996). Note that anecdotal records of Manx Shearwater *Puffinus puffinus*, Mottled Petrel *Pterodroma inexpectata*, White-bellied Storm-petrel *Fregetta grallaria*, Red Knot *Calidris canuta*, and Brown-hooded Gull *Larus maculipennis* have not been listed as we have insufficient knowledge of date, location or observer. Additionally, previously published records of Olrog's Gull *Larus atlanticus* and House Martin *Delichon urbicum* are not included as their identification is now regarded as not confirmed.

Species	Scientific name	Status
Black-necked Swan	*Cygnus melanocoryphus*	V (1,1)
Upland Goose	*Chloephaga picta*	I
Chiloe Wigeon	*Anas sibilatrix*	V (6,8)
Blue-winged Teal	*Anas discors*	V (1,1)
Emperor Penguin	*Aptenodytes forsteri*	V (9,9)
Adélie Penguin	*Pygoscelis adeliae*	V/OB (19,20)
Southern Rockhopper Penguin	*Eudyptes chrysocome*	V/OB
Royal Penguin	*Eudyptes schlegeli*	V (5,6)
Magellanic Penguin	*Spheniscus magellanicus*	V (8,9)
Southern Royal Albatross	*Diomedea epomophora*	NBV
Northern Royal Albatross	*Diomedea sanfordi*	V (nd)
Antipodean Albatross	*Diomedea antipodensis*	V (1,1)
Sooty Albatross	*Phoebetria fusca*	V (7,7)
White-capped Albatross	*Thalassarche steadi*	V/OB (11, 4)
Salvin's Albatross	*Thalassarche salvini*	V (2,1)
Antarctic Fulmar	*Fulmarus glacialoides*	NBV
Antarctic Petrel	*Thalassoica antarctica*	NBV
Broad-billed Prion	*Pachyptila vittata*	V (3,4)
Slender-billed Prion [1]	*Pachyptila belcheri*	NBV
Kerguelen Petrel	*Aphrodroma brevirostris*	NBV
Great-winged Petrel	*Pterodroma macroptera*	V (3,3)
White-headed Petrel	*Pterodroma lessonii*	V (5,5)
Atlantic Petrel	*Pterodroma incerta*	V (9,13)
Soft-plumaged Petrel	*Pterodroma mollis*	NBV
Grey Petrel	*Procellaria cinerea*	NBV
Little Shearwater [2]	*Puffinus elegans*	V (2,2)
Sooty Shearwater	*Puffinus griseus*	NBV
Great Shearwater	*Puffinus gravis*	NBV
Cattle Egret	*Bubulcus ibis*	V (>45, >300)
Cocoi Heron	*Ardea cocoi*	V (2,2)
Great Egret	*Ardea alba*	V (4,4)
Snowy Egret	*Egretta thula*	V (3,3)
Turkey Vulture	*Cathartes aura*	V (17,8)
Peregrine Falcon	*Falco peregrinus*	V (4,4)
Allen's Gallinule	*Porphyrio alleni*	V (1,1)
Purple Gallinule	*Porphyrio martinicus*	V (1,1)
Rufous-chested Plover	*Charadrius modestus*	V (1,1)
Solitary Sandpiper	*Tringa solitaria*	V (2,2)
Spotted Sandpiper	*Actitis macularius*	V (1,1)
Little Stint	*Calidris minuta*	V (1,1)
White-rumped Sandpiper	*Calidris fuscicollis*	V (22,23)
Baird's Sandpiper	*Calidris bairdii*	V (1,1)
Pectoral Sandpiper	*Calidris melanotos*	V (7,7)
Wilson's Phalarope	*Phalaropus tricolor*	V (2,2)
Dolphin Gull	*Leucophaeus scoresbii*	V (4,6)

[1] Also widely known as Thin-billed Prion.
[2] This is the form increasingly known as Subantarctic Little Shearwater *Puffinus (assimilis) elegans*.

Table 2. Occasional breeding species, visitors and vagrants to South Georgia. *continued*

Franklin's Gull	*Leucophaeus pipixcan*	V (2,2)
Arctic Tern	*Sterna paradisaea*	V (3,5)
South Polar Skua	*Stercorarius maccormicki*	V (1,1)
Long-tailed Skua	*Stercorarius longicaudus*	V (1,1)
Eared Dove	*Zenaida auriculata*	SAV (1,1)
Barn Owl	*Tyto alba*	V (1,1)
Dark-faced Ground-tyrant	*Muscisaxicola maclovianus*	V (1,1)
Eastern Kingbird	*Tyrannus tyrannus*	V (1,1)
Grey-flanked Cinclodes	*Cinclodes oustaleti*	V (1,1)
Chilean Swallow	*Tachycineta leucopyga*	V (4,5)
Barn Swallow	*Hirundo rustica*	V (8,8)
Long-tailed Meadowlark	*Sturnella loyca*	V (1,1)
House Sparrow	*Passer domesticus*	SAV (1,1)

P. vittata breeds on Tristan da Cunha but appears to be only a very rare visitor to South Georgia, particularly in years when warmer waters extend southwards. Two other seabirds are far more regular visitors to South Georgia than had been recognised before the 1970s: Kerguelen Petrel *Aphrodroma brevirostris* (plate 87) and Soft-plumaged Petrel *Pterodroma mollis*. The final seabird which is now recognised as a regular non-breeding visitor is Southern Royal Albatross *Diomedea epomophora*. This is seldom seen in coastal or shelf waters, but is regularly identified over deeper offshore waters.

The remaining seabirds listed in table 2 are known from only a few records and are best considered as vagrants. There are very few confirmed records of Arctic Tern *Sterna paradisaea*, but this species winters in numbers in the Weddell Sea, and so would be expected to pass through South Georgia regularly on migration.

Eight wader species have occurred as vagrants on South Georgia, largely those that would be expected based on their migratory patterns but to our knowledge Little Stint *Calidris minuta* remains the only formal record for South America. Other non-passerines include three species of waterfowl, four herons, two gallinules, two raptors, one pigeon and one owl (table 2). Of these, Cattle Egrets *Bubulcus ibis* have turned up sufficiently frequently for the species to be classed as a regular visitor. Since the first record, in 1977, Prince & Croxall (1996) documented a total of 191 birds, with marked arrivals in 1978, 1980, 1988 and 1989. No fewer than 26 came aboard the US research vessel *Nathaniel B. Palmer* halfway between the Falklands and South Georgia, and disembarked at Stromness whaling station in May 1993 (Prince & Croxall 1996). Since then, single birds and the occasional party (one of 22 birds) have been recorded in most years.

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87. Kerguelen Petrel *Aphrodroma brevirostris*. This species is a regular visitor to shelf waters around South Georgia, but does not breed there.

Cattle Egrets have occurred elsewhere in Antarctica, as far south as the Argentine Islands off the west coast of the Antarctic Peninsula at 65°S. Recently, sightings have been fewer, although they are still recorded in most years.

Passerine vagrants are few and only Chilean Swallow *Tachycineta leucopyga* and Barn Swallow *Hirundo rustica* have occurred more than once. Dark-faced Ground-tyrant *Muscisaxicola macloviana* and Long-tailed Meadowlark *Sturnella loyca* are both widespread in South America and breed in the Falklands, while Grey-flanked Cinclodes *Cinclodes oustaleti* is found in southern South America and Eastern Kingbird *Tyrannus tyrannus* winters south to Argentina.

The South Georgia avifauna thus totals 87 species, of which 29 are regular breeders, three are occasional breeders, nine (all seabirds) are regular non-breeding visitors, 45 are vagrants (two of which were ship-assisted) and one species was introduced but is now extinct on the island. Species for which we have anecdotal knowledge of sightings since 1995 in or near to the South Georgia area, but insufficient information on date, location or observer, include Manx Shearwater *Puffinus puffinus*, Mottled Petrel *Pterodroma inexpectata*, White-bellied Storm-petrel *Fregetta grallaria*, Red Knot *Calidris canutus* and Brown-hooded Gull *Larus bruniceph alus*.

Potential future records

The many changes in status and additions to the South Georgia avifauna evident from Prince & Payne (1979), Prince & Croxall (1983, 1996) and this paper, coupled with rapidly increasing knowledge of field characters of seabirds and significantly greater observer coverage, suggest that new species will continue to be added to the South Georgia list. Increased observation will probably show that some species known only as vagrants or rare visitors are actually regular in small numbers. These could include Northern Royal Albatross *Diomedea sanfordi*, White-headed Petrel *Pterodroma lessonii*, Great-winged Petrel *P. macroptera*, Atlantic Petrel *P. incerta*, Broad-billed Prion and Little Shearwater *Puffinus elegans*. Seabirds that might be expected to occur occasionally include Manx Shearwater, Mottled Petrel, White-bellied and Leach's Storm-petrels *Oceanodroma leucorhoa*. It is also conceivable that oceanographic conditions bringing warmer water south, coupled with a strong northerly airstream, might also bring species common in temperate and subtropical waters of the South Atlantic, such as Atlantic Yellow-nosed Albatross *Thalassarche chlororhynchos*, Spectacled Petrel *Procellaria conspicillata*, Trindade Petrel *Pterodroma arminjoniana*, Cory's Shearwater *Calonectris diomedea* and White-faced Storm-petrel *Pelagodroma marina* into South Georgia waters. At present there are no records of any other taxon in the Wandering Albatross complex (e.g. Tristan Albatross *Diomedea dabbenena*) from South Georgia waters, although recently a single (ringed) Antipodean Albatross *D. antipodensis* was found on Bird Island. Tristan Albatross is widespread (but rare) in temperate waters well to the north and the Antipodean Albatross occurs regularly on migration off the coast of southern Chile; both might occur in South Georgia waters but will be challenging to identify at sea.

Both Pomarine *Stercorarius pomarinus* and Arctic Skuas *S. parasiticus* have been seen at latitudes farther south than South Georgia, while Sabine's Gulls *Xema sabini*, which winter in the Benguela Current and are seen commonly off southern South Africa, might wander to South Georgia occasionally. A number of other shorebirds with long migration routes that carry them to southern South America may overshoot to South Georgia; these include Grey Phalarope *Phalaropus fulicarius*, Upland Sandpiper *Bartramia longicauda* and Least Sandpiper *Calidris minutilla*. It is also possible that South American Snipe *Gallinago paraguaiae* might wander to South Georgia from the Falklands or southern Patagonia. Passerines are less easy to predict, but possibilities include Purple Martin *Progne subis*, White-crested Elaenia *Elaenia albiceps*, Patagonian (Rufous-backed) Negrito *Lessonia rufa*, and Rufous-collared Sparrow *Zonotrichia capensis*. But experience elsewhere suggests that the safest prediction would be that one of the next species to be added to the South Georgia list will not have been predicted.

The importance of South Georgia

In terms of seabird abundance, and especially biomass, South Georgia is without doubt one of the world's most important seabird islands. Even today, with petrel populations perhaps an order of magnitude lower than before the introduction of rats, it is estimated that over 100 million individual seabirds are based there. South Georgia is the world's most important breeding site for six species (Macaroni Penguin, Grey-headed Albatross, Northern Giant Petrel, Antarctic Prion, White-chinned Petrel, Common Diving Petrel) and is probably in the top three such sites for seven others (King Penguin, Gentoo Penguin, Wandering Albatross, Black-browed Albatross, Southern Giant Petrel, Black-bellied Storm-petrel, South Georgia Diving Petrel). Several of these species are also Globally Threatened or Near Threatened (see table 1), which underlines the importance of South Georgia and of actions to improve the conservation status of its species. Although South Georgia is currently classified by BirdLife International (see Poncet 2006) as a single Important Bird Area (IBA), closer scrutiny may well reveal that it is better viewed as comprising several distinct IBAs. In addition, if the South Georgia subspecies of the Yellow-billed Pintail was reinstated at species rank, then South Georgia would, under the BirdLife classification, become a full Endemic Bird Area, rather than a secondary area as at present (Stattersfield *et al.* 1998).

Present threats to South Georgia breeding birds

The populations of breeding birds on South Georgia are threatened both on land and at sea. On land, the most important factors governing the distribution and abundance of breeding seabirds are the presence of introduced Brown Rats and Reindeer, and the impact of the expanding population of Antarctic Fur Seals.

Brown Rats have had a major effect on the South Georgia avifauna. Rats were introduced accidentally by the early whalers and sealers, possibly as long ago as the eighteenth century, and now occupy the entire northeast coast of the island, and the northwestern portion of the south coast. Their most significant impact has been on the endemic South

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88. Where Tussac Grass *Poa flabellata* is accessible to Antarctic Fur Seals *Arctocephalus gazella*, the habitat is extensively degraded, and no longer supports nesting birds. The rapid expansion of the seal population following collapse of the sealing industry has significantly reduced the area of nesting habitat for seabirds on South Georgia.

Georgia Pipit, which has been completely eliminated in all areas with rats. However, the presence of rats also has a major impact on some burrow-nesting seabirds, with some smaller species being absent entirely in areas with rats. In addition to Brown Rats, House Mice are known from a few areas of South Georgia. In areas where mice are present, populations of South Georgia Pipit are significantly reduced.

Where Reindeer are present, their grazing has modified the natural vegetation extensively. In particular, they have reduced the coverage of Tussac Grass, thereby eliminating important breeding habitat for many burrow-nesting species, and have collapsed existing burrows by trampling. However, areas with Reindeer also contain Brown Rats, and while these areas have greatly reduced numbers of burrow-nesting seabirds it is not easy to separate the relative impact of these two introduced mammals.

The expansion of the Antarctic Fur Seal population also affects the habitat for breeding seabirds. The most severe impacts are the destruction of tussac grassland (plate 88) and a shift in the vegetation, with replacement of Antarctic Hair-grass *Deschampsia antarctica* by the introduced Annual Meadow-grass, which is more tolerant of trampling and enhanced nutrient input. In northwest South Georgia (the source of Antarctic Fur Seal population recovery and expansion), much of the low-altitude grassland has been effectively destroyed as a breeding habitat for seabirds, as well as for South Georgia Pipits and South Georgia Pintails, thus restricting many species to sites inaccessible to the seals. The extent to which such displacement has been accompanied by local population decline is uncertain.

In the marine environment, widespread and traditional threats such as oil pollution, toxic effects of chemical residues and ingestion of plastics are generally uncommon, even rare, among South Georgia seabirds, though more problematic for those species which move to South American coastal waters in winter or are transequatorial migrants. The main threats to seabirds at sea come from interactions with commercial longline and trawl fisheries. A substantial mortality of albatrosses as bycatch in longline fisheries, and its major role in their population declines, was discovered in the early 1990s. It was then recognised also to involve giant petrels, and especially White-chinned Petrels, for which population trend data were scarce or absent. In 1997, bycatch estimates were produced, indicating that around 6,000 albatrosses and petrels were being killed annually around South Georgia and that longline fishing was the likely main cause of the declines in the island's Wandering, Black-browed and Grey-headed Albatross populations. Decisive action for the compulsory use of a suite of technical and operational measures to address this problem was taken from 1998 onwards by CCAMLR, the body responsible for the management of Southern Ocean fisheries, including those around South Georgia. With the wholehearted support of the Government of South Georgia and the South Sandwich Islands, and the UK, these actions reduced the problem to negligible proportions locally over the next five years (Croxall 2008). Similar problems, but at a smaller scale, were also evident in seabird mortality associated with trawl fisheries and these were also tackled effectively in the fisheries around South Georgia.

Unfortunately, bycatch of South Georgia seabirds in longline and trawl fisheries is still widespread and substantial in many areas outside South Georgia waters. This affects juveniles and immatures throughout the year and adults outside the breeding season. For South Georgia birds the most serious problems are in the waters of, and adjacent to, northern Argentina, Uruguay and southern Brazil; there are also severe problems in the Benguela and Humboldt Currents and in the southern Indian Ocean for some species. Despite the creation of an international convention, the Agreement on the Conservation of Albatrosses and Petrels (ACAP), to address these (and all other) threats to albatrosses, giant petrels and *Procellaria* petrels and the increasingly effective activities of the BirdLife Albatross Task Force in the Benguela Current system and in the southwest Atlantic, South Georgia albatrosses and large petrels are still being killed at levels that are unsustainable. Most species continue to decline at rates of between 1% and 4% per annum.

Mitigation: eradication of rodents

A phased eradication of introduced rodents on South Georgia began in March 2011, with the aerial spreading of rodenticide-laced cereal bait over 128 km² of the central north coast. This project is financed and run by the South Georgia Heritage Trust, and it is expected that two further seasons of bait spreading will be required before the entire island can be declared rodent-free. South Georgia is many times larger than any island hitherto targeted for rodent eradication, but its larger glaciers are barriers to rodent movement and effectively divide the island into many separate but contiguous baiting zones, each of which can be treated independently.

The return of birds to breed in areas from which their ancestors were displaced decades or centuries ago is expected to commence in some species soon after rodents have been removed. However, most of the seabird species affected demonstrate high natal philopatry, so range expansion will be slow and it may be centuries before a new steady state is achieved. At that time the abundance of species especially vulnerable to rat predation, such as storm-petrels, Blue Petrels and South Georgia Pipits, may be one or two orders of magnitude greater than now.

Past and present climate change

In common with all of Antarctica, South Georgia is recovering from the last glacial maximum, when it was covered in glaciers that extended to the edge of the present continental shelf. Although the presence of small refugia cannot be discounted, we must assume that the bulk of the present flora and fauna has colonised in the past 17,000 years or so. In geological and evolutionary terms, the present seabird fauna represents a relatively recent colonisation. The growth and decay of continental ice sheets in cycles of 40,000 and 100,000 years, driven by changes in the earth's orbit (Milankovitch climate cycles), will thus have exposed and removed breeding habitat for seabirds on a regular basis, and also shifted feeding grounds as the oceanography changed.

At present, most of the glaciers on South Georgia are retreating as the climate warms (Gordon *et al.* 2008). While altitudinal shifts in breeding distribution are possible as vegetation zones move higher, the major influence of current climate change is to allow the further spread of introduced Reindeer and Brown Rats out of areas that were previously delimited by impassable glaciers and the sea. This leads to the probability that, in the absence of rat eradication measures, seabirds currently isolated from such threats will become exposed, with consequent declines in population and breeding success.

The warming climate is also having more subtle effects, including reduced winter snowfall and summers that are becoming longer, and perhaps wetter. The data are currently anecdotal but there are indications that climate change is increasing the breeding potential of both Reindeer and Brown Rats, and also of South Georgia Pipits. In the last case, longer summers allow for longer and more productive breeding seasons, with dispersing juveniles being seen more widely than previously.

It seems probable that the species most vulnerable to ongoing climate change are those whose ecology is intimately associated with sea-ice. It is quite possible that Snow Petrels and Chinstrap Penguins may eventually not breed at all on South Georgia. Those species with specialised habits closely adapted to current South Georgia conditions are also likely to be affected, and both Gentoo Penguins and Imperial Shags may decline. For species dependent on the proximity of feeding areas such as the Antarctic Polar Front, which may move farther from South Georgia, more demanding foraging may lead to the population decline of, for example, Macaroni Penguins, King Penguins, and Grey-headed Albatrosses. If oceanographic conditions cause a substantial change in krill availability around South Georgia, that could promote large-scale changes in the abundance and composition of the marine avifauna.

The future: tourism and conservation

Some 6,000–7,000 people visit South Georgia each year. The majority are recreational visitors on cruise ships but other visitors include yacht crews and contract workers, researchers, military personnel and passen-

gers on a variety of vessels associated with resupply, research, fishing and military activities. Ship-based tourist activities include shore landings and Zodiac cruising, with occasional sub-aqua diving, camping, mountaineering and kayaking excursions. The only land-based tourism facility on the island is the South Georgia Museum at Grytviken. There are no accommodation facilities for tourists on the island, although those on climbing and scientific expeditions are permitted to camp, and both day and longer-term visitors occasionally occupy the field huts on the central north coast. Current legislation requires all expeditions and any visitors wishing to stay overnight on South Georgia away from King Edward Point to obtain Government permits.

It is unlikely that the tightly regulated tourism will have any significant negative impacts on the environment or wildlife of South Georgia. Indeed, the burgeoning awareness of South Georgia and the problems faced by its wildlife is likely to be beneficial in bringing increased pressure for all initiatives seeking to restore the wildlife to its former glories (before humans arrived); the ever greater number of visiting birders will also undoubtedly add to our knowledge of the island's birdlife.

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British Antarctic Survey

89. Peter Prince at Bird Island, South Georgia, where he undertook pioneering work on the feeding and reproductive biology of albatrosses. He also made the first scientific study of Blue Petrels *Halobaena caerulea* there, and both organised and led the first all-island survey of the breeding birds of South Georgia.

Citril Finch on Fair Isle: new to Britain

Deryk N. Shaw and Roger Riddington

Richard Johnson

Abstract A Citril Finch *Carduelis citrinella* was found on Fair Isle on 6th June 2008; it remained on the island until 11th and was trapped on 7th. The bird was in immaculate condition and was accepted by both BBRC and BOURC as the first record for Britain. As well as the circumstances of the record, this article discusses the status and distribution of the species, together with

For both of us, Friday 6th June 2008 will forever remain an acutely poignant day for reasons entirely unconnected to birds. At 2.00 pm that afternoon, along with most resident Shetland birders and a few hundred others, we had attended a memorial service to celebrate the life of Vaila Harvey, the youngest daughter of Paul and Elizabeth Harvey, who died of cancer at the age of 16 on 22nd May 2008. It was inevitably a highly emotional afternoon, and puts the rest of this paper in its true context. All mobile phones were switched off at the service, held in Sandwick, in south Mainland Shetland, and we were thus unaware of events on Fair Isle, where DNS was then the Observatory warden.

At about midday, Fair Isle resident Tommy Hyndman spotted a yellowy-green, finch-sized bird feeding in his garden at the Auld Haa. An inexperienced but enthusiastic watcher of birds, Tommy had arrived with his family from his native USA to live on Fair Isle in 2006. Unsurprisingly, he didn't recognise the bird immediately, but after watching it and consulting a field guide he decided that it was a Citril Finch *Carduelis citrinella*. He phoned the Obs and left a message, as he often did when he saw unfamiliar birds. Some little time later, Mike Gee was the first birder on the scene, although he was unaware

of the news and just happened to be passing. He listened to Tommy's story, but the bird had by then disappeared. Given the circumstances, Mike was understandably sceptical but, half an hour or so later, as the bird materialised in front of him, he perked up significantly as he realised that it was indeed a male Citril Finch! Shortly afterwards, Elizabeth Riddiford and then Paul King arrived on the scene, followed by Kevin Shepherd, who had been Assistant Warden at the Obs in 1985 and was staying at the Auld Haa with his wife Roya. With the identification finally confirmed, news spread quickly at last and all interested parties on the island made a beeline for the Haa.

Back on mainland, and a little after 4.00 pm, RR was taxiing Deryk, his wife Hollie and Neil Thomson, skipper of the *Good Shepherd*, back to Grutness (the *Shepherd* had been chartered to bring friends to the service). About halfway to the boat, we finally became aware of what had been happening on Fair Isle, via that year's Assistant Warden, Simon Davies. Having the skipper in the car meant that there was sufficient flexibility for RR to nip home and change out of his suit and join the Fair Isle residents heading back to the isle. After an extraordinarily smooth trip in calm, foggy conditions, we arrived on Fair Isle at about 7.00 pm. The two of us were whisked down to the Haa in the Obs van and were relieved to find that the bird was still within 100 m of where it had first been found. We were soon enjoying good views: what a smart little bird!

It remained on the island until 11th June, and some 50 or more folk made the trip to see it, either from Shetland or from farther afield. It was trapped on 7th June, which enabled a closer examination of its condition.

Identification and description

As the multitude of excellent photographs of the bird testify, it was a distinctive creature. It was essentially a small, yellowish finch, about the size and shape of a Siskin; the bill shape was pretty similar to that of a Siskin (marginally shorter?) and it was long-winged, the primary projection being judged in the field to be as long as the exposed tertials. The tail was strongly cleft and it looked relatively long-tailed in flight.

The bird's head sported an extensive pale, ash-grey 'shawl', wrapping right round the nape and across the ear-coverts to finish either side of the throat. Forehead/forecrown, chin/throat and the ear-coverts beneath the eye were, like the rest of the underparts, a bright, slightly greenish-tinged

Rebecca Nason

90. Male Citril Finch *Carduelis citrinella*, Fair Isle, June 2008.

yellow. The underparts were uniformly coloured and unmarked save for very faint mottling along the upper flanks.

The mantle and scapulars were a plain, quite bright olive green, only faintly mottled. The tertials and wing-coverts were blackish, the tertials with tips and distal edges greenish-yellow, the narrow feather edges becoming paler towards the base. The greater and median coverts were broadly tipped greenish-yellow. The wings were blackish-brown, neat and well kept, and with narrow pale (green) fringes to the flight feathers. Rump and lower back bright yellow, the yellow extending well beyond the base of the shortest tertial, where it 'mushroomed' slightly. The tail was blackish, with just thin pale fringes to the feathers.

The bill was pinkish-grey, the legs dark pink and the eye dark.

It was clearly a male, on account of the bright, 'pure' colours generally, but in particular those of the 'shawl', throat, breast and upperparts (Svensson 1992).

In terms of European species, only the recently split Corsican Finch *C. corsicana* is similar, but that species is brown-backed. Female Citril Finches are somewhat less bright than males but in combination the head and wing pattern should rule out the other essentially greenish finches in Europe, at least with a half-decent view. As the story of the bird trapped at Great Yarmouth, Norfolk, in 1904 (see below) shows, however, escaped cagebirds from other regions also need to be eliminated.

The Fair Isle bird spent its first day on the island in the vicinity of the Haa, flying off in the evening about half an hour after we arrived. During the rest of its stay it was more mobile around the island, although the area around Barkland was especially favoured. It was generally to be found feeding on Dandelions *Taraxacum officinale*, often in the company of Twite *C. flavirostris*, and to the relief of all concerned it completely ignored all the bird feeders at the Haa. On the first day it was approachable and not at all perturbed by its admirers, but was perhaps less approachable on subsequent days (a common pattern of newly arrived migrants). It sang frequently during its stay from fence posts and a variety of other perches.

Condition

In the hand it was confirmed that the bird's condition was immaculate. Given that the greater coverts were all of the same generation, and the tail feathers were broad towards the tip and well kept (rather than narrow, pointed and worn), it was aged as an adult (Svensson 1992). This was supported by the general state and brightness of the plumage. Given that some finches undergo a complete post-juvenile moult, however (for example European Serins *Serinus serinus* in the south of their range; Ginn & Melville 1983), it may be best to regard the age as uncertain. There were no visible signs of captivity whatsoever, no abnormalities or irregularities in either the plumage or the bare parts of the bird (plate 91). The biometric data collected during the ringing process are given below.

Wing length	81 mm
Weight	14.7 g
Fat (scale 0–8)	3
Muscle (scale 0–3)	2

Status, distribution, movements and vagrancy

Status and distribution

The Citril Finch is an endemic European species, occurring predominantly in the mountains of central and southwest Europe, where it frequents semi-open montane coniferous forests, in particular where spruce *Picea* stands border alpine meadows. The majority (80%) are found in Spain, where they breed from the Pyrenees in the north to the Sierra Nevada in the south (Baccetti & Märki 1997). In southern France the breeding range includes the French Pyrenees, Massif Central, Cévennes, Mont Ventoux and the Alps. To the north, it breeds in the Jura Mountains of Switzerland, southern Germany and France, and also reaches the Black Forest region of southern Germany and the Vosges region of eastern France (Cramp & Perrins 1994). Southern populations are largely resident or short-distance altitudinal migrants but many northern breeders desert the breeding areas in winter (see below).

According to BirdLife International (2004) the population exceeds 250,000 pairs and increased between 1970 and 1990. Although

no trends are available for the period after 1990 from France or Spain, there is no evidence to suggest that its status has changed significantly during that period.

Movements and migration

The Citril Finch is often considered to be resident within its breeding range or a short-distance altitudinal migrant, wintering mostly above 1,000 m (some birds descend to lower elevations, particularly during periods of heavy snow). This pattern seems generally true for southern populations, including those in the southern Alps, Pyrenees and Spain. However, birds breeding to the north, in the Jura, northern Alps and Black Forest, largely desert the breeding forests during winter. For example, Snow & Perrins (1998) noted that birds regularly remain in the breeding areas of the French and Italian Maritime Alps, and in the mountains of southern France including Cévennes, southeast Massif Central and the western edge of the Alps from Vercors to Monts de Vaucluse. In Switzerland, however, most of the breeding population is migratory and here it winters

Deryk Shaw

91. Male Citril Finch *Carduelis citrinella*, Fair Isle, June 2008.

regularly only in the Valais canton in the southwest of the country, and less regularly on the south-facing slopes of the Jura and Alps. The whereabouts of the northern population in winter is poorly understood.

Borras *et al.* (2005) suggested that an unknown proportion of Citril Finches breeding to the north of the Pyrenees is migratory, with (at least) two migratory routes – one to the southwest of the breeding range, crossing the Pyrenees to reach wintering sites in northeast Spain, the other to the southeast and into northern Italy. Borras *et al.* discussed the possible origins of Citril Finches wintering in substantial numbers in Catalonia, northeast Spain; based upon recoveries of three ringed birds*, they established that some birds move southwest in winter and that Catalonia may be an important wintering area for at least some northern breeders. [* One ringed at Col de Bretolet, Switzerland, was controlled at Sallent, Catalonia (625 km SW); one ringed at Solsona, Catalonia, was recovered at Col du Rousset in the Rhône-Alpes (440 km NE); and one ringed at Vallon de Combeau (Rhône-Alpes) was controlled at Solsona, Catalonia (445 km SW).]

While some birds leave the Alps and move into Spain, others appear to migrate to the southeast, into northern Italy. For example, Fornasari *et al.* (1998) captured 206 Citril Finches at two sites in the Orobie Alps in Lombardy, northern Italy, in autumn 1992. Numbers at these sites peaked between late October and mid November and, based upon similarities in occurrence patterns at the two locations, two controls of ringed birds moving between the sites, and an analysis of the birds' body condition, their findings suggest that these sites lie on the same migration route and that the birds were in fact migrating rather than dispersing.

Borras *et al.* also suggested that birds wintering in southern Spain are short-distance migrants dispersing from the largely resident population in the Sierra Morena and the Betic Cordillera (although there is, as yet, no evidence to support that hypothesis).

To the north of the regular breeding areas, and chiefly to the north of the Alps, there are scattered records stretching from west and northwest France and Belgium through Germany to the Czech Republic and Slovakia (Glutz von Blotzheim & Bauer 1997; Snow & Perrins 1998). Hyndman (2008) provided a useful analysis of accepted and published extralimital records for each country. At a similar latitude to Britain, there is an eighteenth-century record from the Netherlands (van den Berg & Bosman 1999), and two records from Poland (one on 12th July 1975, and two together on 1st April 2001; Tomiałojć & Stawarczyk 2003). In addition, there is a recent record from Finland, at a latitude comparable with Fair Isle (an adult female on the south coast, c. 40 km west of Helsinki, from 17th May to 2nd July 1995; Topp 1995). The last record is, however, maintained in Category D of the Finnish List.

To the south, the species is a vagrant to the

Mark Breaks

92. Male Citril Finch *Carduelis citrinella*, Fair Isle, June 2008.

Balearic Islands, Spain, where at least nine individuals have been recorded during the winter months (Borras *et al.* 2005). Although the origin of these birds is unknown, Ferrer (1986) suggested that they may have been of Alpine origin. In addition, there are two records in northern Morocco (from Ceuta, the Spanish territory on the south side of the Strait of Gibraltar), dated 31st March and 20th April 1991 (Thévenot *et al.* 2003).

Origins

As the text above suggests, the identification of the Fair Isle bird was straightforward but judging where it had come from was less so. There is no definitive proof of this bird's origin, but all the available evidence suggests nothing to raise suspicion (in terms of captive origin). Citril Finches are apparently rarely kept in captivity (Hyndman 2008) and there was no evidence of any earlier incarceration: the bird was in perfect condition and behaved entirely normally.

Two possible lines of evidence concerning the bird's origin were followed up after the sighting (Förschler *et al.* 2011). First, the bird's song was analysed from video recordings obtained on Fair Isle. These 'revealed no clear pattern, because the number of available recordings was too small. However, the short length of the song and the compact trill at the beginning... favour a bird from more northerly breeding sites. Indeed, very similar song structures can be found in the Black Forest populations.'

Second, some breast feathers which were dislodged accidentally during the ringing operation were analysed, with the aim of identifying the bird's origins through stable-isotope analysis (see Fox & Bearhop 2008). Using the hydrogen isotope tracer method proposed by Bowen *et al.* (2005), a value of D = -92.43 was obtained, which is equivalent to a deuterium value in the precipitation of Dprec = -66.5. Comparing this value with published figures suggests that the best match with areas where Citril Finches breed was the low mountains of the Black Forest, Vosges and Jura; while the least likely parts of the breeding range for the bird's origin were the southern Spanish mountains, the higher Pyrenees and the Massif Central/Cevennes and the Western Alps.

Unfortunately, the value of the isotope data is restricted for two reasons. The first is the uncertainty about the age of the bird. If the Fair Isle bird was indeed a first-summer that had undergone a complete post-juvenile moult, then both the timing and the location of that moult, in relation to the natal area, are unknown. Moreover, there are no controls (measurements of birds of known provenance from Spain and the Alps and no measurement from one of the few known captive birds), meaning that it is an isolated data point and that the information it provides is limited.

The British List

For many years Citril Finch resided on Category B of the British List based upon a bird caught at Great Yarmouth Denes on 29th January 1904, and subsequently identified as Citril Finch. However, during a reassessment of Category B (pre-1950) records, BOURC examined the specimen (held in the Booth Museum, Brighton) and reidentified it as a Cape Canary *S. canicollis*, resulting in Citril Finch being removed from the British List in 1994 (Knox 1994). The Fair Isle bird thus became the first for Britain and was added to the British List in 2010 (BOU 2011).

Acknowledgments

We thank Peter Kennerley for his help with information on the status and movements of this species.

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Editorial comment Adam Rowlands, BBRC Chairman, commented: 'This record was submitted to BBRC in early 2009 and accepted unanimously in a circulation between April and July of that year. Although the identification was relatively straightforward, the ageing was less so and there was significant debate on that issue. Early in the circulation it was proposed that a moult contrast could be determined between the flight feathers and the wing-coverts in the high-quality images of the bird in the hand, indicating that it was actually a second-calendar-year rather than an adult. This generated significant discussion and external input was sought to provide advice on the age of the Fair Isle Citril Finch. Michael Schaad and Javier Blasco-Zumeta provided very useful insight from their experience of the species in the hand. Neither of them felt that this individual could be aged definitively from the available images, but the general conclusion was that the bird could not be aged definitively as a second-calendar-year. Ultimately, BBRC did not come to a consensus regarding the bird's age, but there was no evidence to confirm that the initial ageing as an adult was incorrect.'

Martin Collinson, BOURC Chairman, commented: 'As can be imagined, the BOURC discussion about provenance was robust. General opinion was that this species was a possible, if unlikely vagrant, but there was clearly real escape potential that somehow needed to be assessed. Whereas the longest movement recorded in *BWP* for this species is 615 km, a vagrant Citril Finch on Fair Isle would have had to have travelled at least 1,500–2,000 km from its breeding grounds. The bird showed no overt signs of a life in captivity, but its weight, at 14.7 g, appears to be at the top end of the range for this species. This would perhaps be unusual for a migrant, especially one with a fat score of 3/8, and could be taken as an anomaly. Research by BOURC members and by Roger Wilkinson, the BOURC's captive-bird consultant, however, confirmed that the species is relatively rare in captivity – maybe as few as 25 pairs in Europe, all of which should be close-ringed. Most breeders keep their Citril Finches in indoor flight cages, from which there is a low risk of escape. Whatever its origin, the bird had undoubtedly made a highly atypical (for this species) sea crossing, and statistically it was overwhelmingly more likely to have come from the European breeding population of around 250,000 birds than the tiny captive population. After consideration, BOURC added the species to Category A.'

Letter

Hearing tests for bird survey workers?

Fifty years ago, in the spring of 1962, I took part in the first year of the BTO Common Birds Census, my patch being in the grounds and adjacent woodland of the National College of Food Technology at Weybridge, in Surrey. One of the commonest birds was the Willow Warbler *Phylloscopus trochilus* and most were located by ear. If I repeated the census now, and assuming there had been no population change, my counts would be much lower, as I would be failing to pick up many singing birds. The ageing process!

Now jump from Weybridge's exclusive St George's Hill to the remote Arabian island of Socotra where, since 1999, I have been engaged in BirdLife International's census to determine the population of the breeding landbirds. This has involved undertaking 400 km of line transects, where all species have been recorded (seen and heard) over a fixed band-width. In spring 2011, I decided to repeat some of the earlier transects in the low coastal habitat of the endemic Socotra Cisticola *Cisticola haesitatus* – a bird located mainly by its high-pitched song. In crude terms, I was recording half the numbers that I did some ten years previously, yet my Socotran companion, Ahmed Saeed Suleiman, with his ever-sharp ears, was recording similar numbers to those of a decade ago.

Back to Norfolk where, for the past three years, I have made TTVs for the forthcoming BTO Atlas. As most *BB* readers will know, this required counting all birds, seen and heard, during a two-hour walk through a designated tetrad, then using this as the basis for a stab at the bird population (breeding and wintering) in the tetrad. Given that I find it now difficult to hear many bird songs farther away than, say, 50 m, and the calls of a number of species impossible to detect, I wonder just how good my population estimates are?

With an ageing BTO membership and therefore, presumably, an ageing voluntary survey workforce, how does this affect our survey results? Certainly I can no longer trust my records if listening for songs and calls is required and I'd hate to think that some species are becoming rarer simply because we can't hear them! It would be interesting to know whether the 'age signal' can be isolated from any long-term survey results.

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Editorial comment Andy Musgrove, Head of Monitoring at the BTO, has commented as follows: 'I'm sure most of us would be quite happy to have Richard's field skills, declining or otherwise! However, these are interesting reflections on a subject that arises from time to time at the BTO, and this reply is the result of discussion with a number of colleagues. Is the average age of surveyors increasing and, if so, what are the implications for the monitoring of birds by volunteers? Unfortunately, it's not easy to answer either of these two questions definitively.

'Despite the wealth of data that the BTO holds on birds, we hold rather less about most of our surveyors. The best information about participant age is probably from the Ringing Scheme, where the median age of ringers hasn't changed markedly since 1999. Of course, we'd really like to have such information for all our surveys, going back to the 1960s, but it just doesn't exist, unfortunately. Many people have a "gut feeling" that birdwatchers are getting older, but it's quite difficult to tease out; to what extent is this simply that each one of us, along with our circle of friends, is getting older? There are still large numbers of younger people interested in birding. Yes, many are, of course, initially motivated by information-fuelled twitching, but they do represent a large cohort of potential recruits as they get older, get jobs, settle down, have kids, and later retire. Indeed, although there may be relatively low numbers of new

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surveyors in their teens and twenties, the newly retired generation is a superb source of help that can often contribute many times the numbers of hours of a younger contributor.

'However, even if one assumes that there has been an increase in the average age of surveyors, can we pick out an "age signal" in our monitoring? This is difficult to isolate against the many other factors that affect bird populations. For example, the Breeding Bird Survey (BBS) does a good job of monitoring trends of the Goldcrest *Regulus regulus*, but might we be missing an increasing proportion of them each year, due to a lower detection of their high-pitched song by older surveyors? Grasshopper Warbler *Locustella naevia* is another species increasingly missed by older ears; the draft results of the Atlas suggest that this species might be disappearing from large parts of southern England but increasing its range somewhat in the north. Perhaps this in itself is evidence against the observed changes being strongly driven by age of observers; it seems unlikely that we have an ageing network in the south and a more youthful one in the north.

'One way to be able to measure the age signal would be to have an independent measure of abundance against which to compare. For example, one might compare trends from BBS (where detection is mostly by song) against numbers of adults trapped in mist-nets during Constant Effort Ringing. Again, though, other biases come into play, such as differences in habitat representativeness of the two schemes. A better approach might be to look at measures of detectability from within BBS (broadly, the ratio of birds detected in the 0–25 m band nearest the transect line, to those detected in the next band – the 25–100 m band). If you could show a decline in this ratio over time, and link that decline to the age of individual observers, and perhaps also link it to the pitch of the song or call of the bird species involved, then this could be evidence for such an effect occurring. However, even if you could detect such an effect, it would not imply an impact on national population trends unless, as discussed previously, you knew that the age-structure of the participants as a whole was indeed changing. Not easy!

'In short, I think that we recognise the potential importance of the issue, but don't see too much evidence of effects yet. We're always amazed by the longevity and resilience of some of our long-standing surveyors, while the incredible level of participation in the 2007–11 Atlas, including thousands of new volunteers, has showed us that volunteer bird surveying is not on its last legs yet. Keep up the good work everyone!'

Notes

A new Mediterranean breeding site for the Eurasian Curlew, in Italy

The breeding distribution of the Eurasian Curlew *Numenius arquata* (hereafter 'Curlew') ranges from northern Spain in the southwest to northern China in the northeast (Delany *et al.* 2009). To the south of this range in Europe, only a few sites have been used irregularly; in Hagemeijer & Blair (1997) only two sites are marked, one in Slovenia and another in Croatia. The latter site, along the Croatian coast, was at that time the only known breeding site in the Mediterranean, but Curlews no longer nest in Croatia (BirdLife International 2004; Stroud 2004; A. Radović pers. comm.). Thorup (2006) and Delany *et al.* (2009) both suggested that the species does not breed in the Mediterranean.

In the lagoon of Venice (Italy), Curlews occur throughout the year; midwinter counts during 2002–07 gave an average total of 1,791 birds (Scarton & Bon 2009), and hundreds of birds are recorded regularly in late spring and summer, but breeding evidence has not previously been reported.

Over the last 20 years, we have monitored waders and seabirds breeding in the Venice lagoon saltmarshes (Scarton *et al.* 1994; Hale *et al.* 2005; Scarton 2010). In 2005, we started regular surveys of waterbirds nesting on dredge islands. These artificial sites, which are in effect reconstructed saltmarshes, have been built in the lagoon since the end of the twentieth century, using sandy and silty sediments from the regular dredging of lagoon channels and inlets. In just a few years these sites become covered with saltmarsh vegetation, and now support nationally important breeding numbers of several species, including Oystercatcher *Haematopus ostralegus*, Kentish Plover *Charadrius alexandrinus*, Common Redshank *Tringa totanus* and Little Tern *Sternula albifrons* (the four most abundant species; Scarton 2005).

On 11th April 2011, MB was surveying breeding birds at a dredged island of about 10 ha in size, in the northern part of the lagoon. Built in 2002, this site has a mean elevation of +0.6 m above sea level. Most, but not all, of it is submerged regularly by high tides, which have a similar mean height. Along the edges, the elevation is slightly higher and thick stands of saltmarsh plants (*Sarcocornia fruticosa, Arthrocnemum glaucum* and *Atriplex portulacoides*) cover the ground. Lower surfaces are either bare or covered with *Salicornia* spp., while there is an intertidal pond of 2.5 ha in the centre. All around the dredge island large tidal flats become exposed during low tides. When MB landed, a Curlew flew up from the vegetation and around the observer, making alarm calls. In the spot from which the Curlew had flown, a nest with three eggs, similar in size to those of Yellow-legged Gulls *Larus michahellis* but distinctly conical in shape, was found among vegetation dominated by *Atriplex portulacoides*. The eggs were placed on a small, firm mound made of shell fragments

Marco Baldin

93. Nest of Eurasian Curlew, northern lagoon of Venice (Italy), 11th April 2011.

(plate 93). On the same island there were also eight alarming Common Redshanks, one pair of Oystercatchers, one pair of Little Ringed Plovers *Charadrius dubius* and several Yellow-legged Gulls. A search led to the finding of four nests, two of Yellow-legged Gull and two of Mallard *Anas platyrhynchos* with eggs. No other species occurred. On 10th May MB visited the site again; one nest with Mallard eggs and one with Oystercatcher eggs were found, but there was no sign of the Curlew or of the other mentioned species. A photograph of the nest and eggs was sent to Prof. W. G. Hale, who confirmed that it was indeed the nest of a Eurasian Curlew.

In the past we had occasionally observed other Curlews making alarm calls at other sites in the lagoon. Typically, there was no further indication of nesting, but on one occasion (27th April 1985, southern lagoon) RV saw an alarming bird and later found a nest with eggs amid the vegetation, which was not identified at that time. It is thus possible that the species may have nested at this site in the past.

This is the first confirmed breeding of Eurasian Curlew along the Italian coast, and currently this site is the only known breeding site along the whole Mediterranean coast. The only other Italian site is located in the Piedmont region (northwest Italy), where 1–2 pairs have bred in a wooded moorland since 1996 (Bordignon 1999). These pairs often fail, owing to predation by mammals (including feral dogs), human disturbance (the site is a military training area) and fires (L. Bordignon pers. comm.).

During the last 20 years, saltmarshes, both natural and reconstructed, in the lagoon of Venice have been colonised by several waterbirds that had previously not bred in the area, and the population of some of these has grown steadily. Since this site supports about 3,800 ha of saltmarshes and an additional 1,000 ha of dredge islands, habitat apparently suitable for breeding Curlews, it is possible that other nesting pairs will settle in future years.

Acknowledgments

We thank Prof. W. G. Hale for his opinion of the photograph of nest and eggs, and for his revision of this note. Dr A. Radović provided information about the status of Eurasian Curlew in Croatia and L. Bordignon provided unpublished information and advice. The work was carried out under the auspices of the Venice Water Authority (Magistrato alle Acque di Venezia – Italian Ministry of Public Works) through its concessionary Consorzio Venezia Nuova.

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Editorial comment We should like to thank Richard Castell, who also examined the photograph of the nest and eggs, and agreed with the identification as being of Eurasian Curlew. *Eds*

A case of aberrant post-breeding moult coinciding with nest desertion in a female Common Tern

In migratory birds, the timing of moult must be adjusted according to other important physiological processes, most importantly migration and reproduction, which are controlled by endogenous circannual rhythms (Gwinner 2003; Newton 2008). In response to interactions with various environmental cues, the timing and regulation of moult can vary among different individuals and populations of the same species (Holmgren & Hedenström 1995; Gwinner 2003).

In the Common Tern *Sterna hirundo*, it has been widely recognised that moult cycles are typically slow and differ among individuals (e.g. Hume 1993, Craik 1994, Malling Olsen & Larsson 1995, Koopman 1996, Wood & Ward 1996, Becker & Ludwigs 2004, Ward *et al.* 2004), resulting in a large overlap of nearly all age-dependent plumage features in the annual cycle (White & Kehoe 2001; Ward 2002). Post-breeding moult usually starts in or near the breeding area from early July to late August and is suspended during autumn migration (Becker & Ludwigs 2004). However, the presence of non-breeding-plumage features in adult breeders has not been documented before in this species.

Alexander Braasch

Alexander Braasch

94 & 95. Tomma, a ten-year-old female Common Tern *Sterna hirundo* in non-breeding plumage, Wilhelmshaven, Germany, June 2008. This individual, an established breeder at its natal colony, arrived in full breeding plumage in late April 2008 and was first observed showing characteristic non-breeding plumage features in mid June. This aberrant moult coincided with nest desertion during egg-laying.

Here we report a case of early post-breeding moult that coincided with nest desertion in an adult female Common Tern. Observations were carried out at the 'Banter See' Common Tern colony, situated within the harbour of Wilhelmshaven on the German North Sea coast. At this site, all fledglings have been marked with subcutaneously injected transponders since 1992; these transponders transmit individual ten-digit alphanumeric codes if activated by the antennae located on elevated resting platforms and temporarily around each incubated clutch. Up to 16 of the resting platforms were fitted with an electronic balance, with a recording accuracy of ±1 g. This automatic detection

Table 1. Key parameters during the breeding life of female Common Tern *Sterna hirundo* 'Tomma' (for details see text), 2002–09 (data for first clutches only are given). In the 2009 breeding season, 'Tomma' did not breed; in 2010 she did not return to the colony.

	2002	2003	2004	2005	2006	2007	2008	2009
age	4	5	6	7	8	9	10	11
arrival date	21 Apr	22 Apr	22 Apr	15 Apr	19 Apr	24 Apr	24 Apr	11 May
arrival mass (g)	–	134	126	–	131	124	129	129
partner	unknown	'Emmanuel'	'Emmanuel'	unknown	unknown	'Diego'	'Diego'	
laying date	2 Jun	16 May	14 May	4 Jun	31 May	18 May	16 May	
clutch size	2	3	3	2	2	2	1	
chicks hatched	2	2	3	2	1	1	0	
young fledged	0	0	0	0	1	1	0	

– no data available

system allows us to follow individuals throughout their lifetime without the need for retrapping (for more details see Becker & Wendeln 1997 and Becker *et al.* 2001).

During standard observations of parental feeding behaviour in mid June 2008 – the main chick-rearing period at this colony – the unusual appearance of one particular female (ID-code 00013ADE02, hereafter named 'Tomma') attracted our attention. This ten-year-old female, an established breeder at this, its natal colony, showed almost complete non-breeding plumage (a solid white patch on the forehead, a largely dark bill, and a dark carpal bar, together with worn primaries and missing tertials; plate 94). The moult must have taken place at the breeding site because Tomma was observed in full breeding plumage upon arrival at the colony and thereafter (GOG pers. comm.). No adult breeder has been documented in non-breeding plumage at this colony or, to our knowledge, at any other colony this early in the breeding season (cf. White & Kehoe 2001). Most of the time Tomma was observed resting in the immediate vicinity of a deserted nest containing one egg (table 1); this had earlier been assigned to her and her mate 'Diego' (ID-code 0001CE2ECD) through direct field observation (GOG pers. obs.). The clutch was deserted a few days after the egg was laid (in mid May), which is extremely rare in experienced breeders. In mid June, in the days following the first sighting of Tomma's non-breeding plumage, both she and her partner were observed regularly around the nest-site (plate 95) and the male still delivered prey items to Tomma, though at irregular intervals and the items were often refused. However, neither courtship behaviour displays nor copulation attempts were observed at this time. Both birds remained at the colony throughout June; Tomma was last recorded on 5th July, whereas her mate was recorded regularly at the colony until 11th August.

In 2009, Tomma returned relatively late to the Banter See colony (first registration on 11th May) and did not attempt to breed. Owing to the observation effort at the colony, it is highly likely that any tern in non-breeding plumage would have been noticed, so we presume that Tomma was in breeding plumage. Once again, however, she was observed in non-breeding plumage early in the season, in mid June (K. Klose pers. comm.). Her mate from the previous season, Diego, arrived almost three weeks earlier (first registration on 22nd April) and was observed with an unmarked female at a nest on 18th May. In 2010, Tomma did not return to the colony.

The recurrence of an early post-breeding moult in an individual of known age underlines the large possible overlap of plumages within a breeding population. Furthermore, it is a good example of how the timing of moult of an individual may be controlled by intrinsic physiological processes. Because moult is energetically costly (Payne 1972; Lindström *et al.* 1993), it is rare for moult to coincide with other energy-demanding events, such as breeding. Indeed, overlap between breeding and moult is minimised in

most species (and all Laridae), and it is possible that a reproductive hormone may inhibit moult (Dawson 2008). Several studies suggest that the hormone prolactin promotes parental care, and that production of it increases during incubation and chick rearing; levels of prolactin may also play a key role in the initiation of post-breeding moult (Dawson 2008). For example, in Common Starlings *Sturnus vulgaris* Dawson (2006) showed that the onset of moult was closely correlated with decreasing prolactin levels.

In the case of Tomma, we have no measurements of prolactin levels and thus can only speculate on links between prolactin and state of moult. However, it is plausible that a decrease in prolactin concentrations associated with the curtailment of incubation behaviour might have led to the early onset of post-breeding moult. Tomma's breeding history also shows some unusual patterns (table 1) – from 2007 onwards her arrival date was delayed, while clutch size was limited to two eggs after 2005 – which might indicate poor individual condition (Becker *et al.* 2008). Such rare cases of aberrant moult add another source of uncertainty to the already highly flexible moult regime of adult Common Terns.

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Mute Swans eating blackberries

On 18th September 2010, at Honey Street on the Kennet and Avon Canal, Wiltshire, I observed two adult Mute Swans *Cygnus olor* feeding on the fruit of Brambles *Rubus fruticosus* agg. The Brambles were overhanging the bank and the swimming birds had no difficulty in reaching the blackberries, only the ripe ones of which were plucked and eaten. *BWP* makes no mention of fruit being eaten by Mute Swans and this observation seemed to me worth placing on record.

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Gulls feeding on spawning ragworms

On 1st and 2nd March 2010, at Portland, Dorset, I saw hundreds of gulls feeding in a way that I have never previously witnessed in 52 years of birdwatching. These gulls were catching and eating mass-spawning ragworms *Nereis virens* as they emerged from their holes in the seabed. The gulls involved were mostly Herring Gulls *Larus argentatus*, with smaller numbers of Black-headed *Chroicocephalus ridibundus*, Common *L. canus*, Mediterranean *L. melanocephalus* and Great Black-backed Gulls *L. marinus*. The ragworms were coming up from a patch of seabed in Portland Harbour, and another patch in the Fleet near Ferrybridge. Large numbers of these marine worms (called 'King Rag' by sea anglers) must have emerged on those two days to attract so many gulls. The tide was exceptionally low and on 1st March many Herring Gulls were plunge-diving in shallow water to get them. On 2nd March, when the tide was even lower, the gulls were able to grab the worms by simply up-ending, or by finding them in seaweed on the exposed seabed. On both days, c. 300 Herring Gulls (200 in the harbour, 100 near Ferrybridge) were attracted by these worms, with many individuals catching and eating them. I assume that ragworms must normally spawn at a time of day or state of tide that makes them inaccessible to gulls and that, for some reason, in early March 2010, conditions were such (perhaps a combination of high pressure and exceptionally low spring tides) that the gulls were able to take full advantage.

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Presumed pair-bonding of Magpies in winter

On 16th December 2010, I watched two Magpies *Pica pica* perched close together in an oak *Quercus* tree in my garden near Bristol. One broke off a twig some 70 mm or so long and, after pecking at it for a few moments, presented it to the other bird but did not release hold of it. The two birds wrestled briefly with the twig before the first bird retained it. This process was repeated many times during the next ten minutes. Eventually, after the twig was dropped, the birds touched bills and there was mutual preening of the feathers around the bill before the two flew off. I was indoors, so could not hear whether any calls were uttered.

BWP describes pair-bonding in this species as subtle, with few specific displays, and not well known. Neither Goodwin (1952) nor Birkhead (1991) mentioned anything similar, so it seems worthwhile placing these observations on record.

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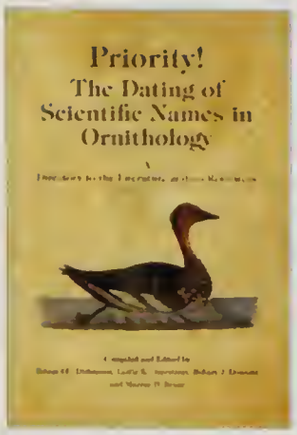
Reviews



Priority! The Dating of Scientific Names in Ornithology: a directory to the literature and its reviewers

By E. C. Dickinson, L. K. Overstreet, R. J. Dowsett and M. D. Bruce
Aves Press, 2011
Hbk, 319pp; CD-ROM containing 68 pdf files; 28 figures
ISBN 978-0-9568611-1-5 Subbuteo code M21204
£80.00 *BB* Bookshop price £70.00

'Zoologists often raced to be first to describe a new animal.' Like the title, this arresting opening sentence captures the attention of the reader. Partly in preparation for the 4th edition of *The Howard & Moore Complete Checklist of the Birds of the World*, the authors have devoted a significant amount of effort to resolving the 4–6% of 100,000 'species-group' names (since the starting point of zoological nomenclature on 1st January 1758) which are associated with publications difficult to date. For many readers the discussions about the principle of priority and what does and does not constitute 'published work' are likely to be of particular interest. Under ICZN Article 9, among the categories of works that do not qualify are specimen labels, copies of unpublished work, abstracts, and text or illustrations distributed electronically. The last of these is likely to prove most problematical in the modern era. Despite impatience in some quarters with the need for printed copies of work, the reasons for it are clearly articulated in the discussion here. Whether the proposal of a requirement of prior registration in ZooBank of new zoological names being introduced electronically will be adopted remains to be seen, but whatever the outcome we should all be concerned about the traceability and long-term storage of electronic documents.

The book is bound and nicely produced. The relatively narrow margins mean that space is well used but there is little room for readers to make their own annotations. In a work of this kind some typographical errors are to be expected, though I was surprised to find examples as early as page 15 and figure 5. The figures are reproductions of documents that illustrate points relevant to the accurate dating of scientific names; all are legible, even if some are inelegant.

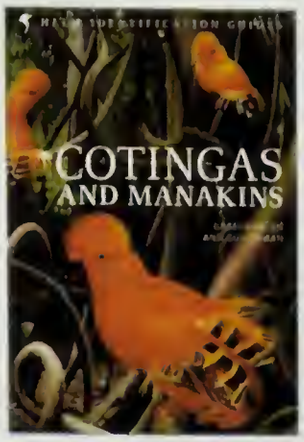
The introductory chapters discuss the International Code of Zoological Nomenclature, the historical and technical background of printing and publishing, and the resources used by the authors. The bulk of the book (pp. 69–253) is devoted to lists of books and periodicals with comments on dating issues. Some of the case studies discussed will be of interest to the editors of British periodicals: of the 15 listed, both *Forktail* and *Ibis* are considered to have presented some problems in relation to dates of publication since 2000. There is also a 13-page glossary and five indices.

The accompanying CD-ROM contains tables compiled by the 56 distinguished zoologists or librarians from 26 countries who have contributed to this work. The data presented relate to 18 books and 47 periodicals, including *Bull. Brit. Orn. Club*, *Forktail* and *Ibis*. There is also an annotated review of date changes explained in the book, along with detailed notes.

The authors are conscious that many ornithologists regard the dating of scientific names as being of minor importance. At one level, whether the naming of *Phasianus colchicus tarimensis* by Pleske should be dated to 1888 or 1889 does seem rather academic. Yet as with any field of human endeavour, if we adopt a system we should try to use it to the best of our abilities. Even when we fail, the mistakes we make during the process are often as interesting and instructive as the final outcomes. The reports on 148 books and 121 periodicals presented in this book cover most of the issues which influence the accurate dating of scientific names. Since scientific names are the current lingua franca of zoologists, we owe a debt of gratitude to those who have laboured long to achieve standard usage.

Given the high price and esoteric content, I suspect that for most *BB* readers this book will not be a priority. For those whose work or interests involve the accurate dating of scientific names, be it in ornithology or other areas of zoology, it is an invaluable resource.

Andrew Harrop



Cotingas and Manakins

By Guy Kirwan and Graeme Green
Christopher Helm, 2011
Hbk, 624pp; 34 colour plates; c. 400 photographs
ISBN 978-0-7136-6025-8 Subbuteo code M16332
£60.00 *BB* Bookshop price £54.00

The forests of the Neotropics play host to the world's most species-rich avifauna, numerically dominated by the suboscine passerines – principally ovenbirds (Furnariidae), antbirds (Thamnophilidae) and tyrant flycatchers (Tyrannidae). These make up a veritable army of small brown birds that tend to be the identification bane of the visiting birder. This trend towards phenotypic conservatism is, however, emphatically bucked by two groups of Neotropical suboscine passerines – the cotingas (Cotingidae) and manakins (Pipridae), which are as a general rule somewhere between gaudy and outrageous and by no means morphologically conservative. Guy Kirwan and Graeme Green, long-time Neotropical stalwarts, have just completed a spectacular Helm Identification monograph treating these last two families. The book covers a little over 130 species and is based not only on an extensive review of past and current ornithological literature but also on many of the authors' own unpublished field observations and museum studies. Molecular work over the past two decades has demonstrated that many of the species formerly placed with the cotingas (Cotingidae) or the manakins (Pipridae) are, in fact, not closely related to either of these two groups. However, to maintain consistency, the book continues to treat all species originally tarred with the broad 'cotinga and manakin brush' so a few 'bonus genera' that have subsequently been expunged from these two families are included, namely the Oxyruncidae (*Oxyruncus*) and Eurylaimidae (*Sapayoa*), some members of the current Tityridae comprising *Schiffornis*, *Laniocera*, *Laniisoma*, *Iodopleura* and a few species hanging in the taxonomic limbo that is 'incertae sedis': *Phibalura*, *Piprites* and *Calyptura*.

Species-level taxonomy is pretty standard, although there are a few divergences from the IOC sequence such as the retention of *Dixiphia* as a monotypic genus (White-crowned Manakin *Dixiphia pipra*) and the continued maintenance of the genus *Chloropipo*, which is often merged with *Xenopipo*; many future splits are also highlighted within the text but not expressively treated as such before the publication of major systematic revisions in the peer-reviewed ornithological literature.

The book starts with a series of brief chapters on ecology and evolutionary biology (such as 'movement and migrations' and 'systematics') followed by 34 colour plates by Eustace Barnes, who has extensive field experience of many of his subjects. The quality and attention to detail of these is generally good (in stark contrast to many poorly illustrated plates elsewhere of the Neotropical avifauna) but I did feel that the jizz conveyed by many of the plates is a bit off, such as the too 'deep-based' bills in many manakins, or a tendency for the *Cotinga* cotingas to look even more pigeon-like than they really are, but these are small gripes. The rest of the book is concerned with the species accounts; these tomes are called 'identification guides' yet the accounts deal not only with detailed descriptions of plumage, morphometrics and voice, but also include comprehensive sections on natural history which will render the book equally valuable to behavioural ecologists and world listers alike. The amount of information synthesised is colossal, bearing in mind the paucity of information for many of these poorly known species. Around 400 colour photographs provide the bulk of the visual reference material, illustrating all species with the exception of the Chestnut-bellied Cotinga *Doliornis remseni*, although that for the enigmatic Kinglet Calyptura *Calyptura cristata* is of the specimen. Mistakes are conspicuous by their absence; one I managed to find was that Black Manakin *Xenopipo atronitens* is not mapped from the Juruena-Teles Pires micro-interfluvium in Amazonia despite information in Lees *et al.* (2008, *Cotinga* 29: 147–157) and this paper being heavily referenced elsewhere in the book.

As a conservation biologist, I would like to have seen a more extensive review of the impacts of habitat fragmentation and perturbation on different members of the group. Yet, for me the book ranks as one of the best monographs ever written for tropical bird families. Poring over the images, plates and descriptions of fantastic displays makes me immediately want to top up my supplies of insect repellent and get back into the forest.

Alexander C. Lees

Natural Focus – the interactive photography tutorial

By David Boag
Natural Focus, Dorset
12-DVD set
£81.60, payable in 12 monthly instalments of £6.80 each

The cover of the box describes this photographic tutorial as designed to 'inspire, demonstrate and encourage creativity' in nature photography. I wasn't quite sure what to expect as I loaded the DVD with interest. A colourful screen opened up with five sub-headings or chapters – Equipment, Technical Basics, Creativity, Animal Life and Habitat & Plants.

I started with 'Equipment' and was given a choice of subjects including camera body, lenses, flash and supports. Within 'camera body' I found an explanation of the difference between compact (point-and-shoot), bridge and SLR cameras. The sections on compact and bridge cameras were rather brief (just two pages on compacts and one on bridge cameras), essentially because the author feels that these cameras don't produce results good enough to be 'suitable for publishing through photography agents', and because he uses mainly SLR cameras. In contrast, the section on SLRs extends to seven pages of extremely useful information covering the basics such as image size/quality, sensor size and metering modes. Moving on to 'lenses', sections explained the effect of focal length, and pages explaining the uses, advantages and disadvantages of standard, wide-angle, telephoto, zoom and macro lenses, teleconverters and close-up accessories, as well as a useful section on auto focus. The heading for this reads 'auto focus & vibration reduction', but I couldn't find anything about vibration reduction in this section.

The chapter entitled 'Technical Basics' covers subjects such as exposure, aperture, shutter speed, flash, ISO, and each section is clearly explained and illustrated with examples. A section entitled 'digital difference' explains that digital images can be cropped, exposure can be adjusted, unwanted objects can be removed, but exactly how to do all these things isn't explained at all. Presumably the author decided that this was too technical to go into in detail (indeed, manipulation of digital images could fill a DVD tutorial on its own), but I think that it would have been useful to at least explain that software programs, such as those usually supplied with the camera, are available to let you make such changes.

Within the chapter entitled 'Creativity', guidance on composition, impact, patterns, lighting and framing & cropping is given, and these are perhaps the sections I found the most interesting and stimulating. They include a host of suggestions as to ways in which one's photography might be improved by introducing the ideas of the rule of thirds, breathing space, foreground interest, focal point, exaggerating perspective, and so on.

Animal Life includes sections on mammals, birds, insects, and underwater. Birds might be of most interest to *BB* readers, though most nature photographers will point their lens at non-avian subjects often enough too. Within the 'birds' section are details of wild bird collections (such as Slimbridge WWT), on attracting birds, hides, nest photography, capturing action and different approaches. Some of these cover the basics, but others include interesting suggestions and ideas, especially different approaches.

The final chapter covers habitat and plants. The 'habitat' section includes many stunning images and lots of suggestions about how to obtain such shots. 'Plants' covers trees and shrubs, flowers and non-flowering plants (such as fungi and berries) and once again includes many stunning and inspiring images.

The program seems to be well designed and is easy to use, with 'Next' and 'Previous' buttons at the bottom right of each screen quickly enabling users to move forward or backwards through the tutorial. I found the program to be lighter on technical detail than I had expected, and feel that greater coverage could have been given to compact cameras for digiscoping and to bridge cameras for general use. They are, after all, more affordable and in the price range of many more people than SLRs. More detail would also have been useful on the general principles of the manipulation of digital images. The sections covering ways in which to improve one's photography skills are certainly very useful, provide much food for thought and do inspire and encourage creativity in the way that the author intended.

At £81.60 (£6.80 x 12 issues) the price does seem rather on the high side, though I gather that the whole work can be purchased on one DVD for £68.00, which is somewhat more reasonable.

David Fisher

News and comment

Compiled by Adrian Pitches

Opinions expressed in this feature are not necessarily those of *British Birds*

Plans for Thames Estuary airport take flight again

The Government launches a formal consultation on the future of UK aviation this month with a new London airport in the Thames Estuary as one option, reviving a plan first proposed 40 years ago.

Environmental campaigners can be forgiven for experiencing a profound sense of déjà vu. In the early 1970s, plans for Maplin Airport, at Foulness in Essex, advanced to the development stage before the scheme was abandoned in 1974. And then there was the proposal for an airport at Cliffe on the Hoo Peninsula in north Kent a decade ago, which prompted the successful No Airport At Cliffe campaign.

Now the airport enthusiasts are back on the Kent marshes with alternative sites for a new London airport, either on the Isle of Grain, off the Isle of Sheppey, or on a brand new island – 'Boris Island', named after its backer, the Mayor of London, Boris Johnson. All of these proposals have one common factor: birds. All of them feature coastal sites with statutory designations for their internationally important winter wader populations. Indeed, virtually the entire Essex and Kent coastlines of the Thames Estuary are designated as Special Protection Areas (SPAs). And where there are thousands of birds, there is a very high risk of... bird strike. Birds sucked into jet engines are a major hazard, every pilot's nightmare. A couple of geese famously knocked down the US Airways Airbus 320 which had to crash-land on the Hudson River in New York in January 2009.

It's now more than 30 years since the 1979 EU Birds Directive, which paved the way for the Europe-wide network of SPAs like those in the Thames Estuary. It was followed in 1992 by the Habitats Directive. Together, they are the twin pillars of nature conservation legislation across the 27 states of the European Union and this is precisely why it's of no little concern to the conservation community to hear the Chancellor, George Osborne, pledge that he won't let 'gold plating of EU rules on things like habitats place ridiculous costs on British businesses...'. Osborne was delivering the Autumn Statement in November last year in which he also stated that the Government would 'explore all options for maintaining the UK's aviation hub status, with the exception of a third runway at Heathrow.'

So the Thames Estuary airport plan has some political capital – but does it have the financial capital? What may finally ground the airport could well be its projected £50-billion price tag. Opposition to the airport has already been mobilised. Carlo Laurenzi, Chief Executive of London Wildlife Trust, said: 'We are horrified by this proposal – especially from a government that claims to aspire to be the greenest ever. The area proposed for the airport supports nationally significant populations of Avocet (*Recurvirostra avosetta*), Ringed Plover (*Charadrius hiaticula*), Grey Plover (*Pluvialis squatarola*), Black-tailed Godwit (*Limosa limosa*), Knot (*Calidris canutus*), Dunlin (*Calidris alpina*) and Redshank (*Tringa totanus*).'

Chris Corrigan, RSPB director for South East England, added: 'Any development of this type in the Thames Estuary would be an irreversible act of vandalism on a grand scale. Paving over communities and wildlife is not the way forward. We should be investing in our environment and tackling climate change, building foundations which future generations will thank us for.' For more on this, see the Friends of the North Kent Marshes website www.northkentmarshes.org.uk

100,000 homes needed this spring

This spring, an estimated 100,000 pairs of Common Swifts *Apus apus* will return from their winter holidays in Africa to once again grace the skies of Britain, and they will need somewhere to raise a brood of youngsters.

Many of these iconic birds will make their way back to the same nest that they have used for several years, but for some the old nest will no longer be available. As we repair our soffits, insulate the loft and replace the old roof with a new one we block up the entrance holes and nooks and crannies that provide Swifts with just what they need to make a home for the summer.

The BTO's Jeff Baker said: 'The Swift is in trouble. During the last decade we have lost over a quarter of our breeding pairs so now is a good time to try and help this majestic summer visitor before it is too late. By putting up a nestbox just

under our eaves we can provide the much needed nesting space that has been lost.'

Edward Mayer, from Swift Conservation, commented; 'There are many different ways of accommodating Swifts on your property, from purpose-made boxes that fit into a wall, to more traditional wooden boxes that can be fitted close to the roof. You can find out how to do it at our website, www.swift-conservation.org.'

Roger Tidman/FLPA

96. Common Swifts *Apus apus*.

First assessment of endangered UK penguins

Almost a year since thousands of endangered penguins were threatened by an oil spill on Nightingale Island – part of Tristan da Cunha, a UK Overseas Territory in the South Atlantic – a survey to assess the birds' population has taken place.

When the bulk carrier MS *Oliva* ran aground on 16th March last year (see *Brit. Birds* 104: 229, 337), a huge effort to rescue the island's Northern Rockhopper Penguins *Eudyptes moseleyi* was launched. The ship was travelling from Brazil to Singapore with a cargo of 65,000 tonnes of soya beans and 1,500 tonnes of bunker fuel when it ran aground. As the ship broke up in the rough seas, the soya and oil were discharged into the waters around Nightingale. In the days that followed, the oil reached Inaccessible Island, a World Heritage Site, and Tristan, more than 30 km away.

Importantly, because the group of islands was home to about 65% of the global population of Northern Rockhoppers, island residents came together with staff from the RSPB and Southern African Foundation for the Conservation of Coastal Birds (SANCCOB) and moved quickly to collect and clean up the oiled birds and prevent many more from coming into contact with the oil. Although efforts to rescue and rehabilitate the penguins were huge, it has been unknown until now just how much the Rockhopper population has been affected by the spill.

While results from the latest counts suggest that the breeding population hasn't suffered as much as anticipated, scientists are warning that the news should be met with caution. Dr Juliet Vickery, the RSPB's head of international research, said: 'It's a big relief that the initial results of the counts are better than we had anticipated. We should not, however, relax our watch. There is much we don't know about this species, and the extent to which breeding colony counts reveal the true picture of population trends is hard to ascertain.

'Though immediate impact is not as bad as we feared, there may be longer-term sub-lethal effects reducing breeding success, so it is vital that we continue to monitor the birds closely for several more years to establish the true impact of the oil spill.' Estimates show that approximately 154,000 Northern Rockhoppers bred on the island in 2011 but estimates in the 1950s suggest there were 'millions' of birds, with two million pairs on Gough alone. The species remains globally threatened and the causes of the historical decline remain unknown.

As well as the long-term effects on the penguins, the oil spill has caused concern for the important rock lobster fishery. The fishery, which is Marine Stewardship Council (MSC) certified as a sustainable and well-managed fishery, is a mainstay of the island's economy. The latest evidence shows that catches are way below normal and rotting soya has been spotted on the traps.

After the disaster, the RSPB launched an emergency appeal to raise funds to help with the clean-up. That appeal has raised almost £70,000 and will be used to support penguin monitoring, strengthen the island's biosecurity, and facilitate rodent control on Tristan to reduce risk of rats being introduced to Nightingale.

Rare Breeding Birds Panel thanks Denis Corley

Members of the Rare Breeding Birds Panel (RBBP) would like to thank Denis Corley for his recent contributions to the national archive of rare breeding bird records held by the RBBP.

Denis will be well known to some *BB* readers as an active raptor fieldworker, focusing on Peregrine Falcons *Falco peregrinus* and working especially in the southern counties of England. He is well known in raptor circles in the Peak District. Continuing an initiative started by the late Derek Ratcliffe, Denis began to compile summary data on Peregrines throughout the UK, gleaning most of the information from county bird reports. This prompted Humphrey Crick (then the BTO representative on the Panel) to ask Denis to help contribute to the RBBP archives by searching through county reports for records of a wider range of species.

So it was that he embarked on this major project, which involved frequent visits from his home in Surrey to ornithological libraries at the BTO in Thetford, the RSPB in Sandy, the British Library in London and the Alexander Library at Oxford University. Beginning in 2008, he typically made two visits a month until January this year. Each visit would involve about six hours of research, and would be followed up with countless hours at a computer, standardising the records into a format suitable for loading into the RBBP's electronic archive. Some reports could be 'processed' in a matter of minutes, but he says that it took him almost three hours to go through the *Argyll Bird Report* for 2004! Denis also had to use his investigative skills to find names for the county recorders in post at the time of each of the records – those individuals were not always named in the published reports!

The RBBP Secretary identified gaps in the archives by checking through the published reports in *BB* and by interrogating the Panel's database for counties that did not make an annual submission during some of the years between 1973 and 2004. Almost 4,200 new records of 65 species were extracted, including 381 records of Common Quail *Coturnix coturnix* and a few additional breeding records of non-native species, such as one of Collared Finchbill *Spizixos semitorques* in the Isle of Wight in 1997 – a new species to us. Perhaps the most significant impact on the Panel's archive was for the Black Redstart *Phoenicurus ochruros*. About 250 new records were added to the 1,700+ existing records – most of the additions were for the core urban counties of Greater London and the West Midlands, meaning that a review of the annual totals will be required in due course.

We were delighted to welcome Denis to a meeting of the Panel in Peterborough in August 2010, and would like to take this opportunity to publicly record our deep gratitude for his hard work for the RBBP over the last four years. Thank you, Denis! (And after completing this mammoth project, we hope that he might be persuaded to continue to help with other RBBP-related research...)

(Contributed by Mark Holling)

Mark Eaton

97. Denis Corley at work in the RSPB library in Sandy, April 2011.

Now where did I read that...?

How many times do you say that to yourself in the course of a year? Fortunately, help is at hand. Keith Naylor, who is well known for his mammoth works of the occurrence of British rarities, and being a tireless and assiduous compiler of data, has sent us a copy of his database which includes almost 10,000 ornithological references. They are ordered by surname of lead author, but, using the search facility in Excel, you can quickly search for something (of course, if you type in 'Blackbird', it will take you a while to flick through the options – but you'll get there). Keith has very kindly allowed us to make this database freely available – visit the *BB* website www.britishbirds.co.uk to download the spreadsheet.

Landmark trial over bird-killing buildings

Many birdwatchers will have a strong interest in the pending verdict in an unprecedented lawsuit currently underway in Toronto, Canada. One of the deadliest threats to birds – building collisions – has, in a sense, been put on trial.

The trial, which began in April 2011, pits the owners of three adjoining glass office buildings – Consilium Place Towers – against two environmental groups – Ecojustice and Ontario Nature. Those groups claim that the buildings, whose exterior faces are almost entirely glass, have been responsible for the deaths of about 7,000 birds in the last decade, making them the most deadly in the entire Greater Toronto area. The lawsuit followed lengthy, failed attempts to negotiate a settlement between the parties.

'Bird-friendly construction is a concept that builders in the USA are increasingly paying more attention to. San Francisco has passed a law mandating bird-friendly construction for certain buildings; so has Minnesota, and other local governments are considering them as well,' said Dr Christine Sheppard, Bird Collisions Program Manager of American Bird Conservancy (ABC), the leading bird conservation organisation in the United States.

According to ABC, even small areas of glass can cause bird fatalities. The amount of glass in the built environment has been rapidly increasing, as new technologies make huge sheets of glass available for applications from home picture windows to skyscrapers. A study from 2006 estimated that between 100,000,000 and a billion birds were killed by collisions annually, in the USA alone. It now seems likely that a billion may be an underestimate. As part of a national-level program to reduce the massive and growing number of bird deaths resulting from building collisions in the United States, ABC recently released *American Bird Conservancy's Bird-Friendly Building Designs*: www.abcbirds.org/newsandreports/BirdFriendlyBuildingDesign.pdf

Birds are killed when they try to fly to sky, trees or structures reflected in the mirror-like surface of the glass, or when they try to fly through what they perceive to be a tunnel through a building. Light emanating from a building or its landscaping at night attracts birds, further exacerbating the problem. 'Many of us have at one time or another walked into a glass door, so we know how jarring that is to our bodies just at walking speed. Try to imagine hitting that same pane at 30 mph. It's not surprising that so many bird collisions prove fatal,' Dr Sheppard said.

Swoop on pigeon fanciers as police investigate Peregrine persecution

A 'multi-agency operation' investigating alleged crimes against Peregrine Falcons *Falco peregrinus* was launched in early February. Police officers issued with search warrants, supported by staff from the RSPB, RSPCA, Natural England and the Countryside Council for Wales, raided the homes of four pigeon fanciers. The raids took place in four separate police constabulary areas: Avon and Somerset, South Wales, Northumbria and West Midlands. A 47-year-old man was arrested in Sunderland in connection with evidence that was seized during the operation. RSPB investigations officer Mark Thomas said: 'The Peregrine Falcon is one of the UK's most heavily persecuted birds of prey, and we hope that today's operation will help further our investigations.'

Bird feeding is recession-proof

While people are tightening their belts, it seems that garden birds are not having to do the same, with sales of bird food expanding amid the cold conditions in the early part of 2012.

Birds are soaring above the economic downturn. When a recent poll asked the question 'Are you cutting back on feeding the birds this winter as a result of pressure on household budgets?', it emerged that birds bring enjoyment that people cannot live without. Two-thirds of respondents to the Omnibus poll fed birds in their garden and, of these, 88% said that they would not be making any cutbacks. Spending commitments of older (66+) garden bird enthusiasts were particularly robust.

The recent cold weather has also seen a spike in the sales of bird food. Compared with mid January, total sales at Ernest Charles, for example, a leading mail-order bird food company, rose more than 70% in early February. The latest figures from Gardman, one of Britain's largest bird food suppliers, also show a sharp rise in bird food sales. This increased spending followed a huge influx of birds into gardens, charted through the simple, weekly observations of BTO Garden BirdWatch survey participants. A significant increase in the numbers of Fieldfares *Turdus pilaris*, Redwings *T. iliacus*, Blackbirds *T. merula*, Bramblings *Fringilla montifringilla* and many other species was noted in early February.

Tim Harrison, of BTO Garden BirdWatch, commented: 'These resilient sales figures show the deep affection that people have for garden birds. This is why, as a country, we spend hundreds of millions of pounds on bird foods and feeders every year.' For a free BTO Garden BirdWatch enquiry pack, e-mail gbw@bto.org or call 01842 750050.

Birds in Cheshire and Wirral – on the web

In late 2008, the Cheshire and Wirral Ornithological Society published a local atlas, *Birds in Cheshire and Wirral: a breeding and wintering atlas.* The book was well received, plaudits including 4th place in the *BB*/BTO Bird Book of the Year competition in 2009. CWOS has now taken another step forward and, with Heritage Lottery Fund funding, put the atlas online www.cheshireandwirralbirdatlas.org

The material is the same as in the book, but displayed in different ways and now freely available for anyone to view. This surely sets a new standard for local atlases to aspire to.

Black Guillies in Belfast

At the March meeting of the British Ornithologists' Club, Julian Greenwood will present some results from the long-term study of the Black Guillemot *Cepphus grylle* colony at Bangor, Co. Down. The results demonstrate that an advance in timing of breeding is associated with temperature rise in sea water and also show that Black Guillemots don't always play happy families. The meeting will be held at Imperial College in London on 27th March 2012 at 6.00 pm. Entry is free and non-members are welcome but please notify Helen Baker (tel. 01923 772441, e-mail helen.baker60@tiscali.co.uk) by 26th March if you plan to attend; for more details, visit www.boc-online.org

Announcements

New county bird recorder

Montgomeryshire Paul Leafe, 24 Parc Hafod, Tregynon, Powys SY16 3EQ; tel. 07890 107101, e-mail paul_leafe@hotmail.co.uk

BB Bird Photograph of the Year 2012

The 36th *BB* Bird Photograph of the Year competition is free to enter and, as usual, seeks to recognise the best and/or the most scientifically interesting photographs of Western Palearctic birds taken during 2011. In addition to the main award, there is a digiscoping section to enter. Up to three images may be submitted and, for full details of the rules and how to submit entries, go to www.britishbirds.co.uk/about/bird-photograph-of-the-year.

The competition will again be sponsored by Anglian Water in 2012, to whom we remain extremely grateful for providing a cash prize of £1,000 for the overall winner. Collins, Helm/Bloomsbury and the Eric Hosking Charitable Trust will continue their long-term support of the Award too. The winning entries will be exhibited at the British Birdwatching Fair in August, where the awards will be presented.

The closing date for the 2012 competition is 1st April 2012.

For extended versions of many of the stories featured here, and much more, visit our website www.britishbirds.co.uk

Recent reports

Compiled by Barry Nightingale and Harry Hussey

This summary of unchecked reports covers early January to early February 2012.

Headlines Surprisingly, many of the more eyecatching records during the period involved passerines: new arrivals included a Paddyfield Warbler in Sussex, a Black-throated Thrush in Co. Kerry (potentially the first for Ireland), a Spanish Sparrow in Hampshire and a Parrot Crossbill in Sussex, while lingering birds included Dusky Warbler and Northern Waterthrush on Scilly, Hume's Warbler in Dorset, Desert Wheatear in Yorkshire and Dark-eyed Junco in Hampshire. In terms of waterbirds, there were a number of good long-staying rarities and a Ross's Gull in Northern Ireland, while more Glossy Ibises arrived and numbers of Iceland Gulls remained impressively high.

Lesser White-fronted Goose *Anser erythropus* Long-stayer, Buckenham/Cantley Marshes (Norfolk), to 7th February. Ross's Goose *Anser rossii* Up to three long-stayers were in north Norfolk to 7th February, with another in north Cumbria, 23rd January to 5th February. Cackling Goose *Branta hutchinsii* Long-stayers on Islay (Argyll), 24th January, at Lissadell (Co. Sligo), three to at least 3rd February, and Torr Resr (Somerset), to 28th January; also Tiree (Argyll), 12th–14th January. Red-breasted Goose *Branta ruficollis* Long-stayers in Devon to 8th February (Exminster Marshes, Starcross and Topsham) and in Essex to 29th January (Tollesbury Wick and Old Hall Marshes). Elsewhere, Drumburgh Marsh (Cumbria), 22nd January, same Caerlaverock (Dumfries & Galloway), 23rd–25th January.

American Wigeon *Anas americana* Long-stayers in Devon, Dumfries & Galloway, Co. Galway, Herefordshire, the Outer Hebrides (two there on 18th January) and Yorkshire; also Coombe Hill Meadows (Gloucestershire), 12th–16th January, North Warren (Suffolk), 1st–4th February and Loch of Strathbeg (North-east Scotland), 16th January and 5th February. Blue-winged Teal *Anas discors* Long-stayers at Longham Lakes (Dorset) to 14th January, and St Mary's (Scilly), to 9th February; also, Lewis (Outer Hebrides), 13th–19th January.

Ferruginous Duck *Aythya nyroca* Long-stayers in Cambridgeshire, Hampshire and Norfolk; Woolhampton GP (Berkshire), 14th–15th January and 1st–7th February; Mullaghmore Lough (Co. Monaghan), shot on 14th January; Thamesmere West Lake (Greater London), 15th–25th January; and Wimbleball Lake (Somerset), 5th–8th February. Lesser Scaup *Aythya affinis* Long-stayers in East Glamorgan, Gloucestershire, Co. Kerry, North-east Scotland and Northumberland; also Dozmary Pool, 15th January to 1st February and Siblyback Resr (both Cornwall), 5th February; Lough Sheelin (Co. Cavan), 18th January. King Eider *Somateria spectabilis* Chanonry Point (Highland), 10th January. Surf Scoter *Melanitta perspicillata* Long-stayers in Co. Cork, Cornwall and Devon; Largo Bay (Fife), 13th January; Llanddulas (Denbighshire), up to three, 14th January to 8th February; Fermoyle, 17th January and Brandon Bay (both Co. Kerry), two on 30th January; Morfa Nefyn (Caernarfonshire), 24th January to 7th February. Bufflehead *Bucephala albeola* Long-stayer Helston Loe Pool/ Drift Resr / Croft Pascoe Pool (Cornwall), to 8th February. Smew *Mergellus*

Richard Stonier

98. Adult Glossy Ibis *Plegadis falcinellus*, Marloes, Pembrokeshire, January 2012.

albellus There was a widespread influx from early February, particularly into East Anglia, with high counts in Norfolk including 22 between Saddlebow and Stow Bridge; in Suffolk, 15 at Southwold and nine at Minsmere; and in Cambridgeshire, 13 at Paxton Pits. Elsewhere, 12 at Wraysbury GP (Berkshire), eight at Eyebrook Resr and 16 at Rutland Water (both Leicestershire & Rutland), with many other waters holding up to four.

White-billed Diver *Gavia adamsii* Long-stayers in Bluemull Sound and South Nesting Bay (both Shetland); South Ronaldsay (Orkney), 15th January and 5th February.

Gerry O'Neill

99. Adult Ross's Gull *Rhodostethia rosea*, Ardglass, Co. Down, January 2012.

Cattle Egret *Bubulcus ibis* Long-stayers at Warblington (Hampshire) and Hillsborough (Co. Down); also, Tophill Low and Hemphole (Yorkshire), 30th December to 1st February. Great White Egret *Ardea alba* Records from Berkshire, Breconshire, Buckinghamshire, Carmarthenshire, Cheshire & Wirral (including a group of three), Cornwall, Cumbria, Dorset, Essex, Gower, Hampshire, Kent, Lancashire & N Merseyside, Lincolnshire, Norfolk, Northamptonshire, Oxfordshire, Shetland, Somerset (including a group of eight), Staffordshire, Sussex, Co. Wexford, Wiltshire and Worcestershire. Glossy Ibis *Plegadis falcinellus* Sixteen were reported in southern Ireland, including three at Belmullet (Co. Mayo), 12th–13th January, one to 27th; four at Dungarvan (Co. Waterford), 14th–15th January; three at Ballycotton (Co. Cork), 28th January; and sightings also in Co. Wexford and Co. Wicklow. In the UK, new arrivals included up to five in the Marloes/Dowrog Common area and 23 in the Carew area (all Pembrokeshire), and up to seven at Bay of Laig (Highland). Elsewhere, there were records from Ceredigion, Cornwall, Devon (at least two), Dorset (at least two), East Glamorgan, Gwent (up to two), Isle of Wight, Sussex and Yorkshire, plus long-stayers in Cheshire & Wirral, Devon, Essex (two), Kent (two) and Lancashire & N Merseyside.

Pallid Harrier *Circus macrourus* Lough Corrib (Co. Galway), long-stayer to at least 4th February. Gyr Falcon *Falco rusticolus* Blennerville (Co. Kerry), 15th January; Stromness (Orkney), 23rd January.

Western Sandpiper *Calidris mauri* Cley (Norfolk), long-stayer to 31st January. Long-billed Dowitcher *Limnodromus scolopaceus* Long-stayers at Kidwelly Quay (Carmarthenshire), to 8th February, Wigtown (Dumfries & Galloway) to 21st January, and Lodmoor, with two to 12th January, one 2nd February, presumably same Langton Herring (also Dorset), 3rd–4th February; Fahamore (Co. Kerry), 13th–16th January; The Cull (Co. Wexford), 14th January to 8th February. Spotted Sandpiper *Actitis macularius* Long-stayers at Chew Valley Lake (Avon), to 6th February, the Plym Estuary (Devon) to 5th February, and Lyme Regis (Dorset), to 29th January; Christchurch Harbour (Dorset), 1st–8th February. Greater Yellowlegs *Tringa melanoleuca* Loch Fleet (Highland), long-stayer to 14th January. Lesser Yellowlegs *Tringa flavipes* Burnham-on-Sea

Steve Culley

100. 'Northern Long-tailed Tit' *Aegithalos c. caudatus*, Luddenden Dean, Yorkshire, January 2012.

James Packer

101. Male Spanish Sparrow *Passer hispaniolensis*, Calshot, Hampshire, January 2012.

(Somerset), long-stayer to 4th February.

American Herring Gull *Larus smithsonianus* Castletownbeare (Co. Cork), 14th January; Poolbeg (Co. Dublin), 30th January. Iceland Gull *Larus glaucoides* Following the record influx into the Northern Isles and Ireland in early January, numbers remained impressively high in the north and west throughout the period, with (for example) at least 200 in Shetland. Peak counts for particular sites included 82 in Stornoway Harbour (Lewis) on 20th January; in Orkney, 50 in the Sand Geo area on 22nd January and 45 at Marwick on 4th February; in Ireland, 25 at Killybegs (Co. Donegal), on 28th January and 20 at Ardglass (Co. Down) on 29th January; 26 on Islay in mid January; and in North-east Scotland 15 at Peterhead on 29th January and 20 in Fraserburgh on 5th February. Ross's Gull *Rhodostethia rosea* Ardglass, 18th January to 5th February. Bonaparte's Gull *Chroicocephalus philadelphia* Long-stayer at Ballygally (Co. Antrim), to at least 8th February; also Lewis, 20th January; Lough Mahon (Co. Cork), 21st January; Cardiff Bay, 22nd January and 5th February; Dun Laoighre (Co. Dublin), 5th February. Forster's Tern *Sterna forsteri* Long-stayer in Galway Bay area (Co. Galway), to 6th February.

Snowy Owl *Bubo scandiacus* Altikeeragh (Co. Derry), 'for a few days' prior to 8th February. House Crow *Corvus splendens* Cobh (Co. Cork), long-stayer to 7th January.

'Northern Long-tailed Tit' *Aegithalos c. caudatus* Luddenden Dean (Yorkshire), two, 16th January to 2nd February, one to 7th February. Hume's Warbler *Phylloscopus humei* Wyke Regis (Dorset), long-stayer to 5th February. Dusky Warbler *Phylloscopus fuscatus* St Mary's, at least one long-stayer to 3rd February. Paddyfield Warbler *Acrocephalus agricola* Pagham Harbour (Sussex), 30th January, and possibly since November 2011, to 8th February. Rose-coloured Starling *Pastor roseus* St Columb Minor (Cornwall), 9th January; Muirhead (Ayrshire), 28th January. Black-throated Thrush *Turdus atrogularis* Mangerton (Co. Kerry), 1st February. Desert Wheatear *Oenanthe deserti* Long-stayer at Bempton Cliffs (Yorkshire), to 8th February.

Spanish Sparrow *Passer hispaniolensis* Calshot (Hampshire), from early December 2011 to 8th February. Arctic Redpoll *Carduelis hornemanni* Long-stayers in Norfolk, at Titchwell to 8th February and Kelling to 17th January, with two 18th–25th January. Parrot Crossbill *Loxia pytyopsittacus* Black Down (Sussex), 26th January to 7th February. Dark-eyed Junco *Junco hyemalis* Hawkhill Inclosure (Hampshire), long-stayer to 6th February. Northern Waterthrush *Parkesia noveboracensis* Long-stayer, St Mary's, 10th January and 1st–3rd February.

John Carter

102. First-winter male Dark-eyed Junco *Junco hyemalis*, Hawkhill Inclosure, Hampshire, January 2012.

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